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Part II

ARCHITECTURAL STUDIES

Volume I

ARCHITECTURAL STUDIES

By Dr. Joseph Louis

Professor of Architecture in the Grand Duchy of Baden and Professor
of the Polytechnic School in Karlsruhe

Second Edition

Revised

1902

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HANDBOOK OF ARCHITECTURE

Part III

ARCHITECTURAL STYLES

Volume 1

GREGIAN ARCHITECTURE

By Dr. Joseph Durm

*Building Director in the Grand Duchy of Baden and Professor
at the Polytechnic School in Karlsruhe*

Second Edition

DARMSTADT

1892

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Dean of College of Engineering

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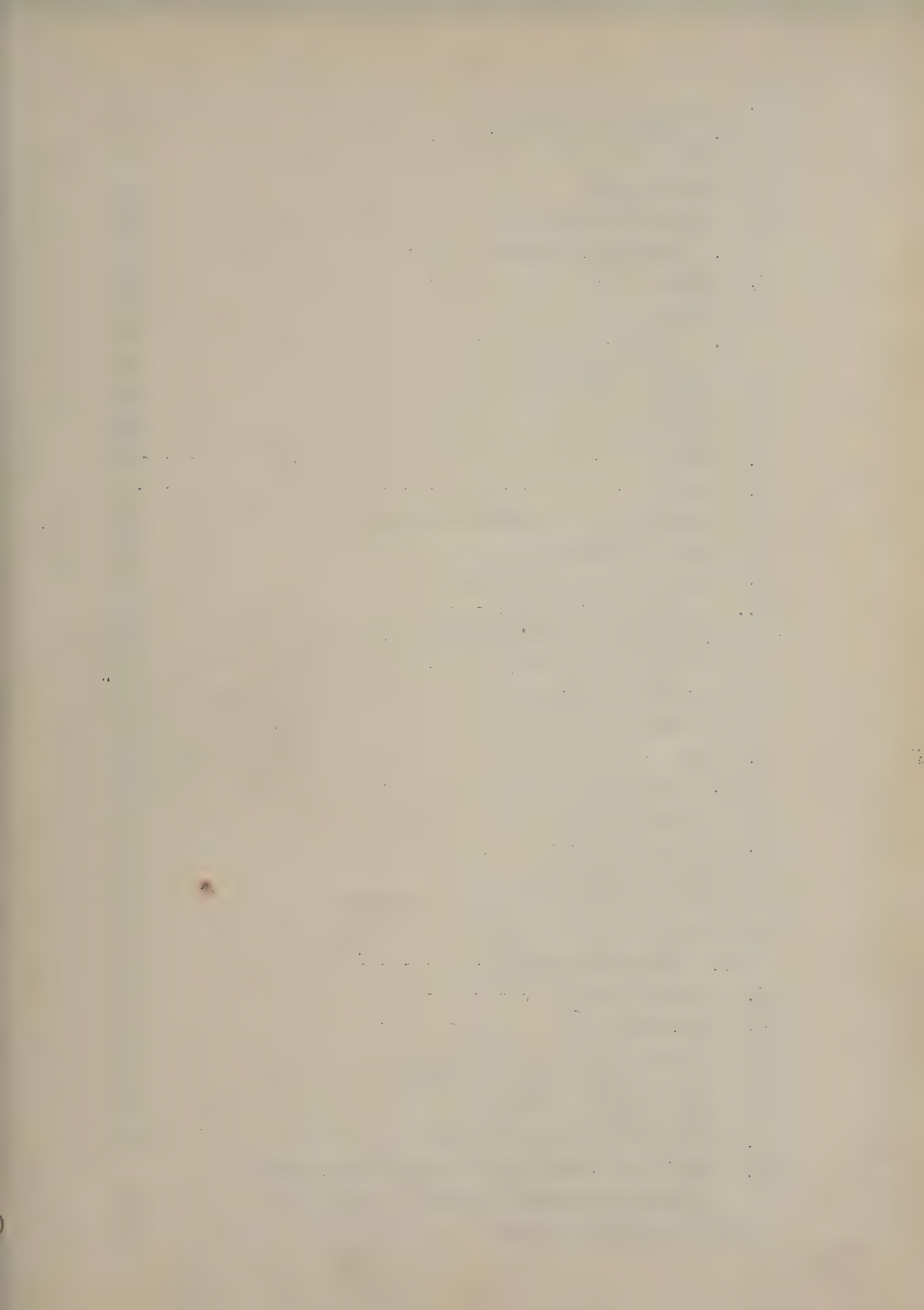
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PREFACE.

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1 "In all arts and sciences not limited to a portion of their scope, but treating this exhaustively, everything appertaining to their domain must be examined. - - - - -

For it is a matter of impossibility, or at least exceedingly difficult, to become a thorough critic of what one has never practised."

Aristotle's Politics. Bk.IV, Ch.1; Bk.VIII, Ch.6.

With the existing multitude of valuable and thorough works on the Styles of Architecture, when a new attempt is made to set forth their nature and development by text and illustration, we believe that a new point of view may be assumed, if those ideas are chiefly placed in the foreground and emphasized, that are of special value and interest to professionals. Therefore a specialist will address the specialist first in the following; an architect will lay before the architect those things worth knowing, and will explain his observations and studies on the architectural masterpieces of those epochs and races, that have played a prominent part in the history of human civilization.

But this cannot be entirely derived from the various existing publications; it must be chiefly based on personal examination, on drawings and measurements of the monuments themselves, or they must be made with reference to tested reproductions compared with the originals, if a certain directness in perception and judgement is to be manifested.---- The search for a natural and historical path of development, and comparative researches on the building forms or products of the different epochs of art and civilization, will be substituted for speculative considerations and abstractions or hypothetical systems.

The restricted limits within which the entire work must be retained do not permit prolix esthetical researches in addition to technical explanations and historical representations; the authors must adopt a concise and simple treatment and thus briefly give the necessary historical survey, with those things possessing technical and artistic importance.

The knowledge of the monuments themselves cannot be made

exhaustive for all styles under the given conditionr, but nothing important or essential will anywhere be omitted.

In many cases, we have considered it necessary to describe the present condition of the monuments, as this appears useful for the decision of various controverted questions, and also for setting young architects aright, when preparing for a study tour, and for protecting them from illusions.

Doubtful reconstructions are on principle omitted, space being only afforded for some examples, where the materials actually exist for a restoration.

2. The treatment of structural problems belonging to the domain of Engineering, such as aqueducts, shore and harbor works, bridges and fortifications, as well as a description of the products of Art Industry, must be omitted, though something concerning these objects may incidentally be given in some chapter of the work.

It perhaps remains to a later time to further extend what is here developed, and by means of an exhaustive treatment to bring it to a more perfectly harmonious conclusion, or to form a more complete whole, than is here possible.

We confidently lay the results of our studies before the the professional Architect, who has mastered the entire realm of Architecture, the Connoisseur and the educated Amateur, since we must accord equal value to the decision of the latter with Aristotle, because practising architects are not the sole and best judges on all points.

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TABLE OF DATES

OF ERECTION OF THE MOST IMPORTANT ARCHITECTURAL MONUMENTS OF
THE STYLE

Date.	Egyptian	Asiatic.	Grecian.	Italian.
B.C.	Pyramids of			
3000	Cheops and Chefren. 4 Dynasty.			
2200	Beni-Hassan. Babylon. Protodoric grotto-tombs. 12 Dynasty.	Nineveh.		
1500	Great activi- ty in build- ing by 18 th Dynasty.			
	Campaigns into W. Asia.			
	Use of Vaults.	Phoenician merchants have extensive com- mercial relations.		
1300	Rameses II. 19 Dynasty.			
	Campaigns into W. Asia.			
1200		Trojan War.	Mycenae. Tyr- ins. Sparta (1200-1100 ?)	
1100		Emigration fm. Europe European Greece to Asia Minor.	Doric immigra- tion. (1124-1044 ?).	
1000		Solomon. Buil- ding Temple. (971) Tombs.		
900		Vaults in Nin- evah.	Lycurgus in Rome founded Sparta. (880?)	754.
800		Great palaces in Nineveh after 700.	Olympian ga- mes (776). Greek colonies in Sicily. and lower Italy.	
		Phrygian rock-cut tombs.		

Date	Egyptian	Asiatic.	Grecian.	Italian.
		Nineveh destroyed.(606).	Heraion in Olympia?.	T.Apollo and Artemesion in Syracuse.
600	Egyptian rule in Asia overthrown(604).	Destruction of Solomon's Temple(586). Croesus and	T. at Assos? T. in Corinth.	Servian walls (578-34?)
			Solon(594). Greek colonies from Black Sea to W. Mediterr. (Massilia).	Cloaca maxima 580.
	Fall of Egyptian empire. (525).	Heraion in Samos.	Olympeion of Pisastratos(530). Hekatompedon on Acropolis in	
500	Extension of Persian empire over Egypt and W. Asia.	Athens. T. Apollo in Tomb of Cyrus.	Delphi. T. on Egina. (530).	Oldest T. in Selinus(600?). T. in Metapontum. T. Poseidon in Paestum.
			Best period of Greek art. Pericles.(469-429).	T. in Selinus. Basilica and T. Demeter in Paestum.
				Paved streets and canals in Marzobatto.

Prominent Buildings in

Asia Minor	Greece	Sicily and Italy.
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Miletus(494). Built 479.	T. Zeus in Olympia completed 456.
Sardes(T. Gybele 440?). Theatre in Iassos.	Parthenon 447-434. T. Nike in Athens. 437-432. Theseion in Athens.

Date	Egyptian.	Asiatic.	Grecian.	Italian.
			T. in Sunion.	
			Propyleion in Athens. 437-432.	
			T. in Phigaleia. 430.	T. in Akragas. 425.
400		Mausoleum in Halicarnassus. 423.	Erectheion. T. on Ilissos. 400?	T. in Egesta. (410?). Gauls in Rome. 390.
		(351). T. in Priene. (340).	Stadion in Athens (350).	
		T. in Magnesia (330-300).	Chor. Mon. of Lysicr. 334.	
		T. in Teos. Lycian and Carian rock-cut tombs.	Mon. of Nikias and Thrasylos 320-319.	Capitol and Temples there.
	Extension of Maced. empire over Egypt			
		W. Asia and part of Greece.		
		Under Alexander the Great. (331).		
			T-s in Nemea and Tegea.	
	Ptolemies.	Artemesion in Ephesus rebuilt.	Philippeion in Olympia (338)?	
300		Seleucides.	Stoa of Attalos I. K. of Pergamon. (241-197).	Tomb of Scipio barbus, Consul 298? Punic wars.
200		Magnif. Build-ings of these monarchs.	continued by Antiochus IV. (171).	Carthage destroyed 146.
		T. in Aizani. Asia Minor a Roman province.	Corinth destroyed. (146).	First private house in Rome. decorated with marble (91).
100			in Athens (100).	T. Fortuna Virilis.
		Herod builds T. at Jerusalem (20).	Athens and Piraeus destroyed by Sulla (86).	T. Vesta. Round T. in Tivoli (72).

Date	Egyptian.	Asiatic.	Grecian.	Italian.
			Market Gate in Athens.	
30		Universal Supremacy of the Romans in World.		
A. D.		Jerusalem des-	Athens resto-	Palaces of
100		troyed(70).	red under Ha-	first emper-
			drian.	ors.
		Revival of cit-	Arch of	Pompeii des-
		ies in Asia	Hadrian.	troyed.
		Minor under	T. Zeus Olymp.	Colosseum. 82.
		Hadrian.	completed(135).	
			Seats placed	
			in Stadion.	
			(140).	
			Odeion of He-	
			rodes Atticus.	
			(140).	

THE ARCHITECTURE OF THE GREEKS.

1. Introduction and General Remarks.

If we examine the masterpieces of Grecian art in the domain of Architecture that have come down to our era, we find predominating in them two modes of building, sharply distinct during the best period, and which we designate by the names of Doric and Ionic.

Architectural traditions from Egypt and the interior of Asia are preserved in these.

The forms came to Greece already prepared to a certain degree, but there experienced that transformation, which proved itself to be for all time the highest degree of perfection of the expression of form, "so that they possess the character of an organic necessity, which sets them up as models, but not merely in a dead sense, as if incapable of progress and change".

Elements of both architectural forms indeed occur in the same buildings. Such a mixture with greater probability indicates the innocent commencement of the expression of form, rather than its debased ending.

From this combination is to be distinguished the well-known use of the already distinct orders in the same building, which never entirely ceased, even in the best period. For example, merely examine the Propyleion in Athens (482 B. C), light Ionic architrave in the interior rests on slender Ionic columns and supports the beams of the ceiling with the aid of the comparatively heavy Doric entablature of the western pediment, also the Temples at Phigaleia and Tegea, where in addition to the orders already mentioned, the so-called Corinthian was also employed, that order which latest assumed a fixed form.

The tombs in the valley of Kedron, the famous Tomb of Absalom, (combination of Ionic columns with a triglyph-frieze and an Egyptian-like cornice), Figs. 1 - 4¹, the Temple of Assos on the Aeolian coast of Asia Minor, (Ionic frieze decorated by figures and used as an architrave, above this being a triglyph-frieze), the Heroon of Theron in Akragas, etc., as well as various representations of architecture on ancient vases and fragments of pottery from Syracuse and Akrai (Triglyphs with dentils over them), pottery fragments from Olympia (regulas and drops with ornamental frieze over them, Figs. 5, 6), may

may serve as proofs of the statement previously made.

Note 1. Nearly all the illustrations to "Grecian Architecture" were made from original drawings, and for the greatest part from original sketches by the author.

The high antiquity of the tombs in the valley of Kedron asserted by De Saulcy², but attacked (see first edition of this work, p 8) is to no longer be accepted. I should prefer to adhere to the views of Göller³, who believes in the originality of the Tomb of Absalom, but in Egyptian form as represented in the next succeeding volume of this work (Fig. 59, p 67), and assumes a transformation into Greek forms at the time of Herod. But the high antiquity of Grecian terra cottas with this mixed style is not to be attacked, and just as little that of the Temple in Assos.

Note 2. Voyage autour de la mer morte et dans les terres bibliques. Paris. 1852-54. Also by the same author; Jerusalem. Paris. 1881.

Note 3. Die Entstehung der architektonischen Stilformen. Stuttgart. 1888. pp. 86, 87.

Grecian art did not occupy itself with the invention of new forms, but with the sifting of those received or acquired, and in their idealization. It could only reach that high perfection of form in the course of time and by steps of transition. Therefore we need not look on perfected Grecian art as a direct development of that formed or existing earlier; it is rather the result of a new intellectual tendency, which shaped its peculiar forms from those already existing, from which may also not be excluded the realization of individual elements, peculiar to the native races.

The Orders (the modern designation for the individual varieties of the developed architectural style) are the result of similar mental exertions, which created an orderly separation in what was received as a confused combination. Formative art here proceeded from the remains of more ancient native and foreign elements; we everywhere find the signs of its secondary origin.⁴ Every people adjoining another nation further advanced in civilization will borrow of that one and appropriate its arrangements; absolute originality cannot exist for a less fully developed civilization, or one entirely undeveloped, if one more fully perfected be near it. But experience in all domains of

Art teaches that imitation precedes originality, which first appears, when after what has been received, the power of creating something is also possessed, and the Greeks had that power!

But the civilization of central Asia and of Egypt was already developed before the idea of adorning Greece with art works arose. These countries were not isolated; they imparted their acquirements to other nations. The Phoenicians, the people of Sidon and Tyre, were the element that transmitted civilization; Asia Minor formed the bridge between the civilizations of Mesopotamia and Greece.⁵

Note 4. Semper. Der Stil in den technischen und tektonischen Künsten. Munich. 1860-63. 2 d edit. Lief. 1-8. 1879. (Unfin.).

Note 5. See on this point, Milchhöfer. Die Anfänge der Kunst in Griechenland. Studien. Leipzig. 1883. Introduction, pp. 1-4.

Thus the forms and orders of Grecian architecture did not spring forth entirely perfect, as did Pallas Athene from the head of Zeus; their splendid fruits were but slowly ripened; the various steps of the progression towards maturity are unfortunately in great part incomplete, or have entirely disappeared.

Because they are not entirely original, and also that the comparison is very seldom made, the severe forms of the Doric, and the graceful ones of the Ionic style have no connection with the character of the people. The Spartans, for example, are usually taken as representative of the Doric race; every art industry and handicraft was prohibited among them as being unworthy of free men; their architects were therefore foreigners or subjugated Achaians; the Dorians of Corinth and Syracuse were accounted among the most luxurious and unrestrained of all the inhabitants of Greece. The men of Tiryns, builders of the gigantic walls there, were considered silly and worthy of ridicule.⁶

Note 6. Braun. Geschichte der Kunst etc. Wiesbaden. 1856-58. 2 d edition by Reber. 1873.

The noblest architectural works in Greece are further not due to the wishes of the people, but to the understanding and the strong wills of the few--highly educated rulers--, thus in Athens, to Pericles, that monarch under the cloak of a republic.

As for so much eminence and grandeur, the greater portion was not produced with the concurrence of the majority, but rather in opposition to their will and desire, also a very frequent occurrence among us Germans at the present time. Com-

pare this with similar phenomena in the golden age of the Renaissance.

"He gilded and decked out our city like a vain woman; he squandered all the money and ruined the finances", was said of the man of his era, who made Greece immortal. However highly the work was esteemed, much as individual artists were honored by the personal friendship of patrons in high station, still a passage of Plutarch throws a peculiar light on the social position of the artist; "the personal pursuit of a low occupation is an indifference to the Better. No youth of noble nature has looked on the Jupiter in Pisa or the Juno in Argos, and therefore desired to become a Phidias or a Polyclète. Just as little would he wish to become an Anacreon, a ⁷Philetas or an Archilochus, because their poems pleased him".

Note 7. See the still more severe opinion in the 4th century B. C. in Aristotle's Politics. Translation by C. & A. Stahr. Stuttgart. 1860. Book VIII. Von der Erziehung, 2, 3, 4, 6, 7.

2. Influence of Building Materials.

The formation of an architectural style is less affected by the character of the people, than by the building materials at the disposal of the people or of the individual for the embodiment of their architectural ideas. To a certain degree, every architectural style must be considered as being the product of two factors; these are the genius of the master and of his era on the one hand, on the other being the nature of the materials afforded by nature.⁸

Note 8. See Suess in Hauenschild. Katechismus der Baumaterialien. Part 1. p 3. Vienna. 1879.

3. Influence of the Climate.

The climate of a country does not absolutely control the artistic form of an architectural style. The Ionic and Doric architectural forms, originating in the sunny and luxuriant soil of Asia, received from the fertile, hot and rainless Egypt, struck root and bore flowers and ripe fruit in the strong stony soil of Greece, never remarkable for its luxuriant vegetation; they even endured the severe climate of a country, in regard to a part of which Hesiod sings: "where the winter is bad, and the summer is also evil, and nothing is good. Here is no longer the most pleasant change of the seasons of the year, as Herod-

otus boasts in regard to the Ionian shore. The skin of a little buck, sewn with ox sinews, is thrown over the shoulder as a protection from rain and snow, and a shaped felt hat is drawn over the ears, that they may not run. On the other hand, the plough and sickle are used in summer in a complete nudity, and the burning of the dog-star is such as to dry up the marrow of the man". Attica, with its sparingly watered stony soil and thin covering of earth, is also called the "stony" or the "rough" (kranaa) by the poets.

The graceful filagree-like, perforated, often heaven-aspiring and finely detailed architecture of the Gothic style, with its abundance of gutters and joints for collecting water and snow, is with difficulty brought into accord with our northern climates, and produces important evidence against the acceptance of a connection between architectural forms and climate.

14. Porticos, loggias, balconies and bay windows, are as native to the north as to the south; the bay window is a characteristic peculiarity of the ancient Arabian and of the northern Gothic dwelling.

Note 9. See Ebers. Aegypten in Bild und Wort. Stuttgart & Leipzig. 1879-80. Street in Suez. II. p 29. Street in Cairo. II. p 108. Street in Coptic Quarter. I. p 198.

4. Wooden and Stone Architecture.

Like its precursors, Grecian architecture became a stone style, and it is actually a fact that most Grecian settlements were located, where an abundance of serviceable stone was to be obtained very near at hand; as examples, take Mycenae, Athens with the adjoining limestone quarry of Lycabettos and the Pentelican quarry but a few hours distant, Syracuse, Akragas, Selinus, Ephesus, and other places. It could become a stone architecture only by preliminary steps and transitions, just as was likewise the case with its forerunners, those of Egypt and of Asia Minor.

Wood and clay (loam) are the first building materials in countries without stone, or at a time when men did not understand how to cut stones, and textile fabrics, wood, and metal, are the recipients of architectonic ornamental forms.

5. Egypt.

For the precedence of a wooden to a stone architecture, the rock-cut tombs of Beni-Hassan in Egypt bear witness, whose corn-

ices imitate wooden construction.

In the structures which served as models for these tombs, the wooden columns had already been earlier replaced by stone columns, leaving with the latter the form of cap remaining between the column and beam as evidence of their origin. (Fig. 7)

Thus originated there at a certain time the mixed method of construction with wood and stone, in place of which was later introduced that entirely of stone.

6. Asia.

In the ancient monuments of Susa and Babylon is preserved the original type of the Asiatic system of construction. Thick walls of sun-dried bricks connected by vaults or terraced roofs, according to whether wood was available or not, characterize them.

Trunks of trees served to cover as well as strengthen the masonry, and a facing of burned and glazed bricks protected the sun-dried bricks from destruction. Tunnel vaults and pendentive domes were already built at the era of Darius. Cuneiform texts speak of posts of cedar wood, decorated by gold leaf, which supported a wooden roof covered with the skins of animals.

The Bible tells us of the wood-work of Solomon's Temple and Palace, with the use of stone for the substructure at the same time, and Strabo admits that in Babylon (for lack of stone) the columns were made of plam trunks.

7. Cyprus.

The combination of wood and stone may also be shown in the ancient Cyprian temples.¹⁰ The Temple at Agios Photios was built before Grecian influences, very simple in architecture, the cella entirely constructed of unburnt bricks, thickly plastered inside and outside and colored, in accordance with a custom preserved there until this day in the building of porticos and peristyles, had the shafts of the columns of wood, while the bases and capitals were made of stone.

Note 10. See Cesnola. Cyprus.

Also compare the system of construction handed down in Lycia, as it is still preserved in the lowlands, an example of which is given in Fig. 8.

16. 8. Lycia and Persia.

Later stone columns in Asia Minor incontestably bear the stamp of their wooden origin and are in some sense the archaistic model

of the Ionic column.

The Lycian rock-cut tombs even slavishly imitate the ancient wooden house, from which stone monumental construction later developed under changed conditions, which already operated more freely on Persian monuments, while all ornaments on the latter are suppressed, which would too strongly recall the abandoned wooden construction.

9. Thin and Thick Columns; Close and Wide Spacing.

Where in nations found in connection with Egyptians and Asiatics, and who received their civilization from the former, columns came into use in architecture, the "thin columns" are to be referred to Asiatic, the "thick columns" to Egyptian origin.

Close and wide spacing then depend upon the nature and resistance of the columns and of the supporting beam resting on them.

10. Greece

We learn from Homer's poems, that enclosing and division walls were built of stone, and that these were covered with wood, metals and tapestries. The roof consisted of beams with a layer of clay, where the ceiling beams were made of fir wood and were borne by beams resting on posts or columns.

According to the evidence of this and other writers, the following methods of construction of religious buildings may now be determined.

11. Wooden Temple.

1. The Wooden Temple, which is not invariably to be regarded as evidence of the highest antiquity; for the means at command and the building material found at the locality decided the material execution, as at present.

For this may be cited:-- the single wooden column in the Heraion at Olympia (Pausanias, V, 16); the Sanctuary of Poseidon Hippios near Mantinea, built of oaken beams by Agamedes and Trophonios (Pausanias, VIII, 10); the Column of Oenemaos, cracked by age and held together by iron bands (Pausanias, V, 20); the Temple of Hera in Metapont, whose columns were of wild grape vine wood. (The grape vine, on account of its size, was rightly classed among the trees by the ancients. Plinius. Hist. Nat. XIV, 2).

"On the market-place of Elis, I saw another form of temple, low and without walls, the roof borne by oaken columns. That this is a tomb is the unanimous belief of the inhabitants", Pausanias further says. (VI, 24).

12. Metal Temple.

Here should also be placed the Metal Temple or that covered with metal, whose former existence was attested by Plutarch and Pausanias, by the citation of the Temple of Athena Chalkoides (5 th or 4 th century ?) and by the statement, that the third Temple of Apollo in Delphi was constructed of metal (648 - 645).

13. Temple of Mixed Materials.

2. The Temple built of wood and stone combined, in which the substructure with the enclosing walls and free columns were of masonry (stone, bricks or sun-dried bricks), but the beams, roof, and the cornice were of wood, when the latter was usually covered with bronze and terra cotta (Metapont), a custom later transferred to stone monuments (Treasury of Gelons in Olympia, Temple in Selinus). This system of construction may be designated as an experiment, a period of endeavor, of progress, and of development of temple architecture, a progression to the final form.

14. Masonry Temple.

3. The Masonry Temple, in which the entire external architecture was constructed of stone, and only the structural parts supporting the covering of the roof (purlins and rafters) and at most the ceiling of the cella (not the ceiling of the columnar portico) were built of wood.¹¹

Note 11. See further, Chipiez. Histoire critique des origines et de la formation des ordres grecs. Paris. 1876.

The Greeks attained to an exclusive stone construction, like the Egyptians, in only a few monuments (Tower of Winds, Choragic Monument of Lysicrates, and others). The climatic differences of the two countries required in the former the gable roof instead of the horizontal roof of stone slabs, and the Egyptians had already long prohibited the use of wood in their religious monuments, when the Greeks commenced to use fluted stone columns. This indeed occurred in the time of the rule of Psamtik, when Egypt was opened to foreigners.

Chipiez¹² and Dieulafoy¹³ believe that the date of the earliest Doric stone temple should not be placed earlier than in the 7 th century (Paestum and Selinus, end of 7 th century, Metapont and Akragas at end and beginning of 6 th century)..

Note 12. See Note 11.

Note 13. L'Art antique de la Perse, Achamenides, Parthes, Sasanides. Paris. 1884-85.

15. Building Materials of the Masonry Temple.

In relation to the materials of the masonry temple, Pausanias states that the (then already roofless and ruined) Portico of Kotys in Epidauros was built of unburnt bricks, together with a small Chapel of Asclepios in Panopeus in Phocis, and the Temple in Stiris in the vicinity, cities without market-places, gymnasia, theaters, or water, where men dwelt in low huts, like mountain cabins and near a torrent. We likewise mention here the upper portion of the walls of the cella of the Heraion in Olympia and a part of the walls in Troja (Hissarlik).

The ancient Temple of Apollo in Megara (later rebuilt in marble by Hadrian), a Temple of Proserpina in Argos, and the Philippeion¹⁴ in Olympia, were built of burned bricks. On the roof of the royal hall in the Keramikos in Athens were mentioned Sculptures in clay like statues. For the extended series of architectural works in Greece further enumerated by him, porous or crystalline limestone is designated as the structural material; Eleusinian, Pentelican and Parian marbles for the monuments of Athens, local tufaceous limestone for the Temple of Zeus in Olympia, and tufa for the terraces in the Altis there. Local stone is briefly designated for the Temple of Athene in Pellene; the circular walls of Ambrosus were of black local stone; the buildings in Bassae, Mantinea and Tegea were famous for their beauty and for the jointing of the stones; in Megara is noted a unique and extremely white shell marble, softer than common marble. The neighboring quarry of Koressos furnished the magnificent white marble for the Temple of Artemis in Ephesus, and the Latomia within the walls of Syracuse supplied for its buildings an excellent light gray porous limestone (like the Paris stone of our time). A yellow and yellowish gray porous limestone was employed in Akragas, Selinus and Egesta (similar to the Jaumont stone of Metz), both kinds being by their structure well suited to receive a durable coating of stucco. All the kinds of stone named could be quarried in blocks of any desired dimensions.

Note 14. According to the excavations, the Philippeion consists of porous ashlar, whose red coating of stucco is still preserved.

16. Development of Forms.

The formal development of wooden and stone forms, of terra

cotta facings, metallic coverings and ornamental pieces, their origin, derivation, and transformations, will be treated under the forms and construction of the chief parts of the different orders. It will here only be generally stated that certain allied relations between wooden and stone structures may always be pointed out in their appearance; in both cases, they are built with posts, columns and beams, to facilitate repairs of supports and ceiling. Therefore similar ornaments also occur on the elements in both materials, which are used in like ways. For this reason, the ceiling beams in both methods of construction must likewise show similar forms of cross section; stylistically correct decorations of the wooden free columns must follow the direction of the fibres, and therefore on these columns, just as well as on stone columns, these may consist of flutes. The same is true of the fascias of the architrave. Ceilings and roofs may both in wood and in stone be composed of structural elements lying horizontally or resting inclined against each other. In the latter way, the ceiling of the very ancient Sanctuary of Apollo on Delos is composed of stone slabs (Fig. 9). The same thing occurred at the entrances to the tombs of the Egyptian pyramids (Fig. 10), and also in a later monument, the Tower of Winds in Athens (Fig. 11). Compare also the buildings in the Hauran and the stone corbels at the overhanging stories of certain Florentine buildings (Via porta rossa).

17. Oldest Structures of Masonry. (Heroic Period).

The stone structures to be regarded as the oldest on Grecian soil are the massive walls of Tiryns, Mycenae, and Argos, the first of these being probably already constructed 12 centuries B. C. and ruined by the Argives about 468 B. C. We find similar walls in Asia Minor at Kalynda and Iassos in Caria, partly laid in regular, partly in random courses, also on Cyprus, Rhodes, Crete, in the Delta of the Nile, and in southern Italy. Who constructed them? Were they members of workmen of a certain race, whose home became too crowded, and seeking new dwelling places or employments, they took their way over the coasts of Asia Minor towards Europe, leaving behind them these vestiges of their industry?

Or are these similarly constructed walls in the localities mentioned independent of each other, similar results of like conditions, produced by nations building in stone?

But similar walls are also found in China and on the table land of Peru. Cuzco, 12,858 ft. above the sea (capital of the Inca kingdom and conquered by the Spaniards in 1533), exhibits considerable remains thereof; these are the ruins of a great Temple of the Sun (Ynti), on whose site now stands a monastery, and the ancient Palace of the Incas. We are here amazed by the accurate jointing of the very large blocks of granite and porphyry of irregular form and laid without mortar. The fortifications of the neighboring Cerro (Ollantay Tambo) are also wonderful, the exquisitely wrought stones of which must have been transported across the river from the quarry 2 leagues distant. The stone walls are composed of blocks of hard granite, up to 7.65 ft. wide, 12.3 ft. long, and 6.56 ft. or more in thickness. Colossal slabs of stone with reentrant polygonal angles alternate in the lower portion of the wall with smaller polygonal intermediate blocks, while materials of more nearly equal dimensions are employed above these.

But the walls are not merely constructed similarly; their openings have the same form as in Egypt, western Asia and Greece, the upright trapezoidal form of doorway diminished upwards. In some cases, the so-called "ears" are even clearly indicated; the pyramidal batter of the wall and the decoration of the doorway by sacred animal forms in relief are also to be found.

One step further;— if we consider the objects of art industry found in Peruvian tombs, we here find ornaments and patterns, whose affinities in form with Egyptian, Asiatic, and Grecian, motives cannot be denied. The chess-board pattern, the fret, etc. occur in a perfectly developed state on textile fabrics and tapestries. The combination of colors therein is generally very happy; fringes of thin cords are found, as well as tassels of wool and cotton, and borders of small pieces of mother-of-pearl or gayly colored feathers are sewed on the edge of the tapestry, upon which thin plates of gold or silver are frequently sewn, — embroidery work as found on the very ancient Assyrian garments. Engravings on copper weapons very distinctly represent the waves of the sea, that characteristic Egyptian and Grecian decoration!

Also on Chinese pottery of ancient times and on Mexican pottery (now in the British Museum) are found ornaments, that striking resemblances to the Grecian; the fret pattern from

Yucatan leaves nothing to be desired in perfection of form in comparison with the Grecian, even as little as the Mexican sea wave pattern and also the recurved ovate leaf (Fig. 12).

The centers of civilization in the New World are on the table lands of Peru, Cundimarca, and Mexico, but in the Old World they are always in a level country! Is there really a connection between these works of the New and Old Worlds, allied in structure and form, but separated by nearly 3000 years? This much is certain, that when Europeans became acquainted with America, the so-called copper colored and peculiarly characteristic American existed there; did he belong to an Asiatic race, which had immigrated in undetermined past ages, or have we to consider a copper colored Adam? the keys are not lost; I believe in no connection here in the first place, for similar ideas are everywhere the result of similar needs, and a wish to conclude that certain similar monuments in different parts of the world are due to the same authors, is at least deceptive.

The same idea is expressed by Virchow in his preface to Schliemann's Ilios:- "But experience has taught us how uncertain are archaeological "guiding muscles". The human mind finds in different localities the same things and in the same place different things. In the same period are developed certain artistic or technical forms without any connection between the artists or workmen."

The Phoenicians were already settled on the coast of Syria in 2000 B. C., and they transported the developed civilization of Egypt and Babylonia to all the shores of the Mediterranean Sea; acquisitiveness led this mobile Semetic race to Great Britain and India. Its proud cities have disappeared from the earth; but vestiges of their activity in building are preserved for us in the noble ashlar walls on the island of Arvad and near Marathus; remains of temples on Malta, Gozze, and at Amrith are further evidences thereof, as well as the massive substructures on the shore and in the Citadel of Carthage, and in the retaining walls of the Temple of Solomon, constructed about 1014 B. C. The wall with closely fitting joints is built of great blocks, moderately bonded; these blocks have drafted margins with rough projecting faces.

Similar characteristics are found in the old walls on the Argolic Gulf; Euripides says that these were in accordance with

Phoenician rules of building. The Phoenicians and Carians are named as the earlier inhabitants of the Greek islands. The latter were often intimately connected with the Hyksos, who ruled in Egypt, and they settled in the Greek islands after being expelled from Egypt. Mention is made of the immigration of Phoenician and Egyptian colonists into Greece. Pelasgians also make their appearance; they are now barbarians, now ancestors of the Hellenes, then a Hellenic race. We will not linger in the foggy and dangerous path of ethnographic research; I conform to Schliemann's view, that the name Pelasgian was originally the designation of some one of the many races, which formerly inhabited Greece, and that this name was later employed as the most general appellation of all Prehellenic races, without regard to its true ethnographic relations. But the Hellenes, which we thus oppose to the Pelasgians, were doubtless nothing more than a single member of the series of allied races comprised under the common name of "Pelasgians".

This masonry is termed Pelasgian and also Cyclopean. Semper calls it polygonal masonry.

We find the walls here considered to be constructed of irregular blocks with spalls in the interstices of the joints, or of carefully wrought polygonal blocks; others consist of horizontal courses of stones (Fig. 13), whose end joints are not always vertical and whose bed joints frequently encroach on other courses. All three kinds occur at the same time. Schliemann divides them into walls of the I, II, and III epochs, but also considers them as contemporary.

22. What was the purpose of these gigantic walls? Among the Phoenicians, they served as dykes and quays, as protecting walls, and as substructures of temples; in Argolis, they were bulwarks for offense and defense, the beginning of a civic commonwealth. Accordingly as each man readily abandoned his dwelling place in earlier times, when compelled by a stronger man, since there was no commerce nor rational agriculture in Greece and no wealth to be acquired, but merely existence to be prolonged, yet circumstances were changed, when men strove for money, fortune and profit. Acquisitions must be secured, protected, and defended from mankind, to whom gains won quickly, boldly and without toil were preferable to those earned by the industry and labor of the hands; defended against robbery, a vocation

conferring fame and not disgrace. The possessors gathered together; the poorer entered the service of the richer; the strongest led and ruled the originally small corporate body. Mining and defense took place behind the walls mentioned, and these circumstances thus gave occasion for strong dwelling places enclosed by walls. Thucydides places the oldest cities far from the sea, those founded later close to it, the former protected by their natural situation, the latter by walls.

Thus may conditions have probably been in Greece at the time of the Trojan War (between 1200 and 1100 B.C.), the first general and politically important undertaking of the Hellenic race.

18. Walls of Tyrins.

The lower circular walls of Tyrins, whose materials were taken from a stone quarry about a half hour distant from the city (see what was said of Settlements), belong by their construction to the most primitive masonry.

The stones are of the most diverse sizes, just as they came from the quarry, without any further work on the end, bed, or face surfaces, and are laid in courses without any cementing material; the interstices produced by the courses are filled with small stone spalls also laid dry. The larger blocks measure 4.92 to 6.56 ft. long and up to 3.28 ft. high (Fig. 14). The walls must originally have had a height of 59 ft. in some places.

23. The casemate-like galleries and their vaulting within these walls are unique. Their clear width averages 6.5 ft. (exact measures are impossible in consequence of the rough and uncut surfaces of the stone), with a height of about 9.84 ft. The walls are composed of three vertical courses, and the ceiling is of two courses of ashlar on each side corbelled out beyond each other, the rude and rough blocks of the uppermost one being bonded together at top, and resting against each other in an arbitrary and inexact manner, resulting from the accidental forms of the stones. With the rude shapes of the stones, this kind of vaulting can just as little be termed pointed-arched, as can the triangular openings in the external wall of the gallery, also formed by corbelling and extending down to the ground. Similar wall openings are found in the regularly coursed walls of an ancient structure near Missolonghi.

19. Walls of Argos.

Cyclopean walls of a perfected type, very carefully executed and coursed with polygonal ashlar, are found on the slopes of the steep and bare rock, on which stands the citadel of Larissa, the former fortress of Argos; they terminate a series of ancient monuments, which extends in the vicinity of the present city. The material is a limestone, now shining with a fine cool gray and glowing with warm tints in other places, that comes from the immediate vicinity. The faces of the larger blocks are 3.81 ft. by 4.27 ft. to 5.91 ft., with neatly projecting faces free from great irregularities and unevennesses; the faces gently curve at the edges, which are dressed with great exactness, showing the very close contact of the stones in the well preserved portions. Mortar is also not employed here. The indenting of one stone into another is frequently quite artificial; the external surfaces of the ashlar are irregular pentagons, hexagons or heptagons. The lower corner-stone of the wall bears on its outer surface a nearly unrecognizable low relief (a sitting figure about 1.18 ft. high), above which is an obliterated inscription (Fig. 15).

Braun and Semper recognize the latent principle of the arch in this irregular network of ashlar subject to tension and compression. The blocks do not rest on each other as in walls of ashlar in horizontal courses; they actually form arches under compression on account of their peculiar arrangement. I may question whether this was the reason for the complicated jointing; the peculiar forms of the materials probably supplied the leading motive therefor. The limestone ashlar or breccia-like stones, of which most polygonal walls are constructed, always have a short conchoidal fracture, and the roughly broken ashlar always have a rounded face, which is most readily and economically dressed with short sides. Materials in strata and break into regular blocks is never used for polygonal masonry; compare the retaining walls of Jerusalem, built of ashlar from the Lebanon (Fig. 13).

Viollet-le-Duc believes these polygonal walls to result from the accidental forms of the quarried stones or boulders; therefore the broadest stones are placed at the bottom in the first course on the ground; the angle between the stones already set is measured by a bevel, and a stone with about the same angle

is sought and fitted there; the same process is followed for the succeeding courses (Fig. 16).

20. Walls of Mycenae.

Mycenae near Argos exhibits the third kind of Cyclopean masonry; the finest remains exist in the side walls of the so-called Treasury of Atreus and in those of the Gate of the Lions, which forms the entrance to the Acropolis. The stone quarry is also here in the immediate vicinity; the material being supplied by the slopes of the two-peaked Mt. Euboea 2297 ft. high, which surrounds the Argolic amphitheatre. The blocks are laid in courses, neither exactly horizontal nor quite parallel, the end joints not being always vertical, and no mortar is used. The faces of the ashlar are parallelograms or trapezoids; the external surfaces are made tolerably even, so far as permitted by the nature of the material; the stones are somewhat curved towards the edges, so that the joints do not exactly fit. The ratio of height to length varies from 1 to 2 or 1 to 3, to 1 to 4 and 1 to 5. The lintel of the doorway is one of the largest wrought stones ever used in architecture. The stability of this masonry chiefly depends on the use of the largest blocks possible, besides the bonded coursing.

The lintel of the Gate of the Lions is 14.76 ft. long, 7.87 ft. wide, and 3.67 ft. high at the middle, its upper side being curved, and it has a clear length of 9.35 ft., the opening being about 0.74 ft. narrower at top. It is not loaded by the masonry above it, but the originally 5 courses are corbelled out to relieve it. The resulting triangular opening in the masonry is then closed by a slab, bearing the most ancient monumental sculptured decoration in Greece. The feeling, that demanded the fine and careful treatment of the ashlar, must also have required the use of sculptured ornament, as we have likewise seen in completed masonry at Argos. The relief slab shows (two bases placed very near each other and covered by a common stone; (Schliemann believes this to be an altar); from this a column rises in the central line of the triangle, whose base is formed by a slightly projecting slab, its greatly injured shaft being joined to the capital by a feebly expressed apophyge. The column was originally diminished very slightly downwards. In the present condition of the original (not the plaster cast), it is hard to accurately determine the amount of this diminution.

The capital consists of a square abacus, beneath which is a heavy annular torus, a gentle transition existing between this and the angles of the abacus or the projecting triangular surfaces; below this is a calyx-like member terminating with an astragal next the shaft. On the abacus lie four rolls, represented in front as circular disks (similar to those mentioned on Lydian sepulchral monuments), above which is a square slab from which a sculptured flower probably arose, as may be seen in analogous representations on ancient coins. Two animal forms, said by Pausanias to be lions, stand on the pedestal and extend towards the column. Their heads and the upper portion of the triangular slab no longer exist. The peculiar fractured surface and also the metallic dowells for the heads show that these heads were not of one piece with the slab, but were fastened to it. The small space remaining on the slab proves that they must have looked outwards from the relief. It is conjectured that the heads were of metal, and this may be true. The treatment of the muscles and the soft forms of the bodies, as well as the tails without tufts, recall Assyrian perceptions and mode of treatment (Fig. 17).¹⁵

Note 15. Compare the allied Phrygian monuments, the ivory hilts of Menidi, and the island-stones of Crete and Rhodes. See-- Jour. of Hell. Studies. Vol. 3, Pls. 17, 18.

21. Phoenician Masonry.

Of especial interest is the Phoenician masonry of the Temple at Bhagiar Kim, about 4 1/2 miles south of the village of Krendi on Malta. Enormous slabs of stone set upright first enclose a semicircle, above which commences the horizontally coursed masonry of great oblong blocks, an arrangement retained in principle in the cella wall of the Grecian temple of the best period. The Temple of Poseidon at Paestum, the Temple of Zeus at Olympia, the Parthenon, the Theseion, the Erectheion, etc., have first above the ground the space-enclosing courses of stones set on edge, above this being only the bonded and coursed ashlar masonry.

In the Temple of Melkart, the masonry of large stones is composed of irregular blocks, one set on another, only restricted by the dimensions of the blocks; no cementing material is anywhere used between the separate stones:

These ancient stone monuments of Phoenician and Pelasgian ori-

gin are so grand and mighty, that one may perceive and be astonished at their expression of an architectural formative power, though rudely acting, although they were equalled and frequently excelled in expression during the Renaissance period by the gigantic palaces of the Florentine nobility. Ashlars 26.24 ft. long, as in the Pitti Palace, with bosses projecting 2.95 to 3.26 ft., as in the masonry of the ~~terrace~~ terrace of the same palace, were not often found or excelled in antiquity.

Polygonal masonry is frequently considered to be a criterion of great age, but various monuments prove this to have been employed in later times in nearly all periods of the Roman empire, both in Asia Minor and also in Greece.

22. Dryopic Walls.

Another kind of masonry requires mention, the so-called Dryopic masonry existing in the remains of ancient buildings in Euboea. Its peculiarity is due to the nature of the materials. Long slabs, breaking proportionally thin and left rough on all sides as quarried, are laid on each other without mortar in courses, leveled up and the joints are filled with small stones. The walls therefore have a thickness of at least 6.56 ft.

23. Walls of Artificial Blocks.

For the walls of sun-dried bricks mentioned by Pausanias, manifest evidence has been found since the discoveries in heaps of ruins at Hissarlik.

The bricks are bonded in courses; the masonry is strengthened by wooden anchors built in and is constructed as in Fig. 19. The unburnt bricks are made of clay mixed with chopped straw and have a thickness of 3.9 to 5.9 ins., with a length up to 25.6 ins., while the clay mortar joints are from .39 to 1.18 ins. thick. The surface of the wall is frequently covered by a thin white wash of clay (like pipe clay) ¹⁶

Note 16. See Durm. Zum Kampf um Troja. Berlin. 1890. Reprint from Cent. d. Bauverwa 1890.

23. 24. Palaces of Rulers.

Palaces of Rulers, Citadels, dwellings of powerful individuals, strongholds for the safekeeping of acquired wealth and the preservation of ornaments and treasures, monumental sepulchres of rulers, memorials for posterity, all these remains of buildings are of architectural importance.

We are only acquainted with the first by means of the Homeric

poems, from which we must conceive the palaces of the rulers to have been somewhat finer, than would be supposed from the defiant and rude fortress walls, if Thucydides be not mistaken, when he says (of course in reference to another point), "It should be understood that Homer, as a poet, exaggerates the greatness and beauty of things." 50

The Palace of Menelaos at Sparta gleamed with bronze, silver, gold, amber and ivory; walls plated with bronze, leaves and jambs of doors overlaid with plates of gold and silver, are found in the Palace of Alkinous.

Homer calls Mycenae "rich in gold"; Thucydides mentions the great treasures of Pelops, brought from Asia by him, and that made possible his power and the assignment of his name to this portion of the country; his descendants, the Pelopides Atreus and Agamemnon, should be considered as "augmentors" of the possessions of the family until the breaking-out of the Trojan War. 25. Royal Palace in Tiryns.

25. Royal Palace in Tiryns.

The Homeric descriptions were succeeded by the results of the excavations in the Citadel of Tiryns,¹⁷ at Mycenae, and at Troja, which are aided by our presentation of a ruler's palace, even if this be merely based on a ground plan. The latter (Fig. 20) exhibits the arrangement of the walls of the upper Citadel, as it appeared with its massive fortifications on the isolated hill-top, rising from the plain. The ashlar blocks of these are limestone blocks, roughed or more smoothly dressed, frequently set in horizontal courses, and are set without mortar, as commonly done in antiquity, which would have had but a limited value in thin layers with the dimensions of the blocks.¹⁸ In the lapse of time, the joints and cavities have become filled with dust and clayey earth, which has suggested the use of clay mortar, but which would indeed have been no better than ordinary lime mortar.

Note 17. See Schliemann. Tiryns. Prehistoric palace of the King of Tiryns, etc. Leipzig. 1886.

Borrmann. Die Burg von Tiryns. Cent. d. Bauverw. 1886. p 89.

Schuchhardt. Schliemann's Ausgrabungen in Troja, Tiryns, Mykenä, Orchomenos, Ithaka im Lichte der heutigen Wissenschaft. Leipzig. 1890.

Note. 18. Stone blocks on the tower are 3.28 ft. high and up

13.1 ft. long; others are 5.58 ft. in length.

The assumption that the water channels were likewise set with clay mortar is evidently to be rejected. ¹⁹

Note 19. See Schuchhardt. p. 40.

29 On the northwest slope of the hill of Mycenae have been found passages in the walls, like those at Tiryns, and which are covered by ashlar corbelled out. Others are horizontally covered, so that in some places, the horizontal covering alternates with a polygonal one. In connection with these, a similarly constructed passage 4.26 ft. wide leads down about 50 steps to a cistern. The very rough and irregularly dressed walls and ceiling are here covered by a coat of white-gray stucco 1.18 ins. thick, which follows the rough surface of the ashlar. The appearance recalls that of certain grottos of the late Renaissance, where the rock-work is made of stucco and cement mortar.

We may well assume in Tiryns a similar coating on the surfaces of walls and ceilings of similar passages in the walls. The use of these passages for storing provisions and for occupation by men and animals, thus becomes more probable.

The ground plan of the Palace is explained by the discoverers, Schliemann and Dörpfeld, as follows, and this explanation may be less readily attacked, since the statements agree with the reality in all points, of which a control of place and location convinces us.

Note 20. Fig. 20 is a facsimile reproduction from Cent. d. Bauverw. 1886. p. 91.

30 "As shown by a glance at the plan (Fig. 20), the fortifications of the upper city exhibit great differences in strength and form. The most remarkable parts here comprise the south wall and the southern half of the east wall, especially since we have been informed of the plan of the frequently described so-called "galleries". The walls here, especially in their lower portions, are penetrated by long narrow passages e, adjoining which are externally a number of rooms f. These internal passages, as well as the stairways leading down to them, were all covered by means of corbelled-out courses of stone, and were probably once lighted by openings like loopholes, as may still be recognized in the passage on the south side. What the purpose of the arrangement described may have been, cannot

be stated with complete certainty; yet the author of the work on Tiryns properly refers to entirely similar designs within the enclosing walls of Carthage, which we know from Appian (Hist. Roman. I. Bekker. 1842. p. 220, 1-8) served as stables, as well as for occupation by men, provisions and war material. It appears questionable, how the now destroyed upper portions of the walls were constructed, and among other points, whether the plan of the lower casemates was repeated there, as in Carthage. To the inner side of the upper walls, and especially at the level of the pavement of the entrance street or of the fore-court, porticos appear to have been attached.

In the southwest angle of the Citadel and on a natural projection of the rock is found a massive tower with two internal rooms, whose purpose remains uncertain, and further northward is an entrance stairway to the Citadel, protected by a separate external work, and by means of which a person coming from the sea would first pass up to the middle terrace of the Citadel, and then by another stairway to the passage adjoining the men's hall of the Palace. Two other side entrances, which perhaps had the twofold purpose of serving as entrances and sally-ports, are found in the lower Citadel; whether a similar one also once existed at the now destroyed southwest angle is no longer to be recognized. The principal gateway b could be used for chariots and horses, and turned away from the sea, lies at the middle of the eastern longer side, and is accessible by a ramp 15.4 ft. wide, which ascends beside the wall. Within the gateway, the way divides to the lower citadel, to the middle terrace, and on the left to the upper citadel. The way to the lower citadel leads through a narrow alley between the eastern wall and the Palace itself, first through an inner barrier gate c, and thence by a separate ascent upwards to the southwest angle of the citadel, from which by a sharp turn to the right, one passes into the outer propyleion i before the courtyard of the citadel. This propyleion represents in its plan with external and internal porticos and the true gateway wall between them, the simplest form of the model for the designs of gateways later treated by Grecian art in such different ways. The base of the walls in rubble stone, the stone thresholds with holes for wooden door jambs, and the circular plinths of the columns, are still preserved. From the inner portico of the propyleion, we can go

through a narrow passage directly to the courts before the women's dwelling, and passing straight forward from thence, enter the great court. This is the fore-court of the Palace, entered through a gateway k, similar to the preceding, but considerably smaller; one first enters a court about 3380 sq. ft. in area, surrounded by porticos. Just on the right of the entrance through the gateway have been found the remains of an altar with a sacrificial pit. This was perhaps an altar of Zeus Herkeios, sometimes mentioned by Homer as found in the aule. The pavement of the court is almost entirely preserved and consists of a coating of lime, and the water is removed by a drain at the north-west angle. Opposite the altar and looking towards the south, lies the chief apartment of the Palace, the men's apartment m (megaron), a rectangle 38.7 by 32.2 ft., characterized alike by its size as well as by its preferred location on the highest point of the rock of the citadel, and accessible from the court through a portico and a separate vestibule. Four columns supported the ceiling of the hall, at whose centre, in conformity to the statements of Homer, is found a circular structure, probably the hearth.

The dwelling of the women is on the east of the men's apartments, but is not in direct connection with them. It exhibits a plan corresponding to that of the men's dwelling, though simpler; first a court, then a portico, from which one passes directly into the hall, and by side doors into the adjoining passages. The women's apartment has an area of about 462 sq. ft.; a hearth appears to have existed at its centre, just as in the men's hall. The floor consists of a coating of lime. In the south-west angle, remains of the ancient stucco on the wall with painted decorations have been found in place.

The purpose of the numerous other apartments of the Palace is not so assured as that of those mentioned. A series of rooms accessible by passages and vestibules lies in the northeast angle; in these should be recognized the sleeping apartments, and also perhaps the armory and treasury of the ruler. Two narrow adjoining rooms on the north side of the court, according to Dörpfeld's conjecture, contained the stairway to the roof, or to a possible upper story. From the court before the women's hall, one passes further southward to a third court. This, with all

3/ adjoining apartments, may have served for housekeeping purposes, and the rooms lying next the front gateway for the quarters of the guard and watch at the gateway.— Another and in part badly ruined group of apartments adjoins the men's hall and its court on the west. Only one room of these may be determined with certainty, the bath-room α , whose floor consists of a single enormous slab of stone 9.84 ft. wide, 13.2 long and 2.3 in thickness, with a total weight of about 44,000 lbs. On the raised margin of the stone, which has a channel for carrying off the water, are regularly spaced holes for dowells, according to Dörpfeld's conjecture, for fixing a wainscoting of wooden planks. Fragments of a great bath-tub²¹ of clay have been found, which stood in this room. The location of the bath-room in the vicinity of the men's court and in convenient connection with the megaron certainly agrees with the ancient custom, also mentioned by Homer, of first affording the refreshment of the bath in part to the coming stranger, before he was received at the hospitable hearth.

The lines of the walls of quarried stone rise but little above the ground; we frequently find only thresholds and vestiges of location; in other places, we still see on the external surfaces the clay coating up to 3.15 ins. thick, covered by neatly smoothed lime plaster, partly with painted decorations. The few remains of building stones (quarried) makes it probable that the superstructure was built of wood and unburnt bricks.²¹ To design a representation of the appearance of this structure must be left to the reader and his imagination.

Note 21. In the mode of building still common today in the Peloponnessus, and especially in the vicinity of Tiryns, with unburnt bricks and wooden anchors, the enclosing masonry usually stands on a course of quarried stones, to protect the perishable material from wet and from the dampness of the ground.

The painted stucco on the walls with its rosettes and spiral forms (see colored plate opposite p. 31) and other ornamentation indicate Egyptian art, and to the same source is likewise to be referred the decoration of a frieze pattern by inlaid slips and beads of blue glass (koanos)²² But with these also occur primitive ornamental forms peculiar to the country; the heart-leaf, the ivy leaf, and the so-called wave ornament. The latter may

indeed be native among all peoples in all parts of the world inhabiting the shores of the sea, as has been shown.

26. Royal Palace in Mycenae.

The excavations undertaken in Mycenae in 1886 by the Greek Archaeological Society under the supervision of Tsountas brought to light a second royal palace with a plan similar to that at Tiryns. The apartment of the one palace designated as the megaron is repeated in approximately the same dimensions, with its arrangement of portico, vestibule, of men's hall with the four marks of the location of columns and the vestiges of the round hearth. These objects, as well as the existence of a threshold of breccia with four holes for the jambs and the limestone floor slabs of the vestibule, injured by fire, we have ourselves examined.

The remains are shown by the corresponding plan of the Citadel,²³ on which may be recognized the location of the court, of some subordinate apartments, and the stairway (20 well preserved steps). As at Tiryns, the plan of the building is only determined by a few courses of stone projecting above the ground.²⁴

Note 22. Also see Heydemann. Schliemann's Ausgrabungen in Tiryns. Zeit. f. Bild. Kunst. 1886. p 125.

Note 23. See Schuchhardt. pp. 319-329 and Pl. 5.

Note 24. Under these conditions, a fatal impression is made on those acquainted with the site of the building, and a misleading one on the reader, only deciding in accordance with the report, since in the illustrations things are represented as existing, which are actually no longer preserved. Schuchhardt, for example, describes (pp 321-324) wooden beams "as in the walls of Troy", - "the roof supported by four wooden columns", - and "what is true for the plan (referring to Mycenae) is likewise true for the superstructure; everywhere the most striking agreement with the Palace in Tiryns. Floors, doorways, posts, thresholds, roof, everything is exactly as there."-- But there is nothing left of the columns, doorways or roof, as we have stated, and there are also no longer any beams in Troy! Now if it even be stated (p. 324), that the mural paintings are richer in one place than in the other, rather too much is still demanded of the reader.

32. The civilization at Mycenae and Tiryns is now generally referred back to the middle of the second thousand years before our era (entire absence of iron articles in the finds leads to this

opinion), and thus the fixing of the destruction of the palaces there at the time of the Doric immigration (1100 B.C.) may be accepted as correct.

27. Royal Palace in Troy.

The excavations in the mound of ruins of Hissarlik (Fig. 21) have brought to light an enclosure of fortifications of small extent (one-third as large as those at Tiryns), defended by strong gateways and narrow towers and enclosing fragments of different buildings. Schliemann recognizes in them the fortress of Priam, the citadel and palace of the ruler of the Troy of Homer, and his opinion is shared at this time by influential savants.²⁵

Note 25. For the different views, see the writings of Bötticher, especially: Hissarlik, wie es ist. Fünftes Sendschreiben über Schliemann's Troja. Berlin. 1890. Also Kunstchronik z. Zeit. f. Bild. Kunst. 1890. pp 242-254. Further, Schliemann. Illos. Lastly, Durm. Zum Kampf um Troja. Berlin. 1890.

A striking description is certainly given by Bötticher in his statement:- "One betakes himself to the remaining outer portion of the mound of rubbish, from which he looks down, as if into a crater. The best place is above the so-called southwest gate. He sees a polygonal terrace, which is Schliemann's Acropolis of Troy! The terrace consists of rubbish crisscrossed by walls down to the original surface of the ground."

We give in Fig. 22 a view from our own sketch on the ground, and also the ground plans of Dörpfeld in Figs. 23 and 24 for further information, and from these it appears that a ramp covered by great polygonal slabs of white stone leads up to the so-called southwest gate, which by its design recalls Etruscan city gates. Within the enclosing walls are first two parallel rectangular rooms, separated from each other by a narrow intervening room, enclosed by unburnt bricks and subdivided in depth by cross walls, which chiefly attract our attention and recall similar walled structures on the area of the Citadels of Tiryns and of Mycenae, where they are recognized as the apartments of the men and the women. The same applies to the superstructure, that has been said in reference to the two palaces in the Argolis already mentioned. Perhaps the representations on the Francois vase afford some commencing points for a reconstruction, though the temple and fountain-house represented thereon do not

exhibit gable roofs, but rather straw and clay roofs of slightly cylindrical curvature. Singularly similar are the widths of the rooms A and B of the plan to those corresponding in Tiryns.

28. Palace of Odysseus.

No perceptible fragments of the much besung Palace of Odysseus have been discovered, since the investigations so far made on Ithaca by Schliemann and others ²⁶ have essentially been of a topographical nature; but the remains of an ancient palace near the Erechtheion were found since 1887 within the cyclopean enclosing walls of the Acropolis of Athens. (See plan of the Acropolis in *Deltion archaiologikon*. 1889).

Note 26. See Schuchhardt. p 341).

"Room succeeds room, and its fore-court is well enclosed by walls and battlements; a gate of two leaves closes strongly; in truth, hardly may a man conquer it."

Thus is the "home" of Odysseus described. The bill of the dung of mules and of cattle before the gate of the court betrays the agricultural pursuits of the owner; the weapons in the men's hall, where fir beams and lofty columns were blackened by the smoke of the open fire and of pine-wood torches, indicate on the other hand the warlike spirit of the master. Stables for draft animals, wagons, and beasts for slaughter, mill and bakery, another court surrounded by porticos, beneath whose protecting roofs strangers reposed, and in whose midst stood an altar of Zeus, a women's hall with columns and adjoining apartments in two stories, are all well arranged together in the citadel.

Purple coverings lie on the seats inlaid with silver and ivory; tables and stools, covered by sheepskins, fill the rooms; doors separate the apartments; they are lighted by golden lamps. Thus walls for defense and offense surround the master's seat; agriculture, hunting, war, and an occasional raid for booty occupy the master, while house industries busy the wife, and a crowd of serving men and maids help in everything. A display of magnificent vessels, beautiful fabrics, women's handiwork, embroideries and woven fabrics is made on occasion; in a large hall for drinking and weapons, the men assemble.

Note 27. Fig. 23 is a facsimile reproduction from Cent. d. Bauverw. 1890. p 424. Also see Zeit. f. Bild. Kunst.; Kunst-

Chronik. 1890. p. 246. Further: *Schuchardt: also Schliemann, Troja*. Leipzig. 1884. Pl. 7. Lastly, *Schliemann. Bericht über Ausgrabungen in Troja im Jahre 1890, etc.* Leipzig. 1891. Especially Plate 3.

29. Domed Tombs.

As the palaces are placed before us, they belong to the same series as the great memorial monuments of the Grecian prehistoric period, the Tholos at Orchomenos and the domed tombs at Mycenae. Architectural creations of the last kind are to be regarded as the climax of a preceding development, whose precursors are to be sought in Asia Minor (Phrygia and Lycia). The Lycian pointed-arched roof reappears in the vaulting; the Lycian rock-cut tomb is the ancient dwelling translated into stone, in which, according to the belief of the ancient peoples, the souls of the deceased again prolonged their existence. But the Lycian house appears as a structure with a rectangular plan, while Vitruvius specifies the circular form for the inhabitants of the Phrygian valleys, constructed of timbers set in conical form with a covering of brush and earth. We should then have before us in these domed tombs the ancient Phrygian huts of brush and earth, translated into stone.

Note 28. See page 65 of the next volume of this Handbook.

The similar primitive model is also found in the structures of the New World, and especially in the Navajo huts near Pueblo. The possibility of the existence of such dwellings is therefore no delusion, and Vitruvius is right, as well as Adler, after him.

Note 29. See Powell. Peru. Bureau of Ethnology. Washington. 1896.

On the way to the gate of the Citadel in Mycenae, we find large subterranean apartments on the slope of the citadel, constructed of quarried stones, and really the chambers mentioned by Pausanias, in which "it is said, Atreus and his children concealed their treasures, the Tomb of Atreus, and the Tombs of all their" ---. It is not quite clear from the quotation, whether Pausanias placed the Tomb of Atreus in the Treasury. The tomb and treasury were frequently combined or were of equal importance; his treasures were placed with the deceased. Compare Schliemann's rich find of golden objects in the five tombs at

the Lions' Gate and others. Plutarch states that Philopoemen was interred in the Treasury at Mycenae. But since a similar plan with six undisturbed bodies and all their ornaments has been discovered in Menidi near Athens, its purpose is no longer doubtful.

An excavation in the hill, a passage-way somewhat more than 19.68 ft. wide and bordered by high and regularly coursed ashlar walls, leads to the entrance doorway of the large Treasury (Fig. 25); the passage-way, walls and interior, are now freed from all rubbish, the solid rock being visible as the floor of both rooms. The visitor enters a circular structure about 49.21 ft. in diameter and height, built of carefully wrought ashlars of hard breccia and covered by a kind of pointed dome (Fig. 26); stones are broken out near the keystone, and the sunlight enters there and illumines the interior, which possesses an appearance of considerable extent. An abundant light also enters through the doorway, now closed by an iron grille. The vaulted surfaces of the walls are formed by corbelling out the separate ashlars, while the circular flat keystone has a tapering form. Omitting this, I counted 33 courses above the floor, which are ³⁴ laid on each other without mortar. The end joints are only correctly dressed radially for a short distance, the remainder being left as quarried, and the interspaces are filled with stone spalls; the entire course is backed with dry masonry of large and small blocks, then being covered with earth. Excepting in the four lowest courses, each ashlar shows two drilled holes; remains of bronze nails are in many, so that a covering of metallic plates may with certainty be assumed to have covered the interior, and which may have consisted of separate zones of ornamental or figure representations, or of separate ornaments, for example, rosettes. ³⁰ The clear width of the doorway diminishes about 6 ins. upwards (Fig. 27); the jambs are formed in the ashlars of the wall and have double reveals, like the lintel, and bear numerous marks of fastenings, holes and pins, and the surfaces of the reveals show the scratches of the saw-blade; the lintel of the doorway consists of two enormous blocks, each 27.89 ft. long and 3.67 ft. high, and it is relieved by corbelling out the ashlars above it, as at the Gate of Lions. The resulting triangular opening in the masonry is without sculptured decoration and is now completely open. The well-known small

39 fragments of a capital (Fig. 28) with zigzag ornaments and of a half column, found near the entrance of the Treasury some years since, with pieces of red, green, and white slabs of marble with reliefs, and the holes in the stones of the jambs and lintel, supply a basis for the assumption that the exterior was completely decorated.

Note 30. According to the latest researches of Dörpfeld, large holes are made by two holes drilled beside each other above the 3 d, 4 th and 5 th courses, close to the joints, at distances of 3.44 to 4.00 ft. Small holes exist in the middle of the 5 th and between the 6 th and 7 th to the 17 th course at horizontal distances of about 2.63 ft. apart. Nothing higher up is to be clearly seen.

It is not impossible that a veneering of marble concealed the entire walls of the passage, that half columns gave a richer appearance to the architecture of the doorway, that a figure relief filled the triangular space above the portal, that color and metallic ornamentation gave to the whole an entirely different appearance, recalling the treatment of certain Pelasgian tombs, and that we have in its present form merely the rough stone nucleus of a once magnificent structure, Asiatic in style.

This assumption agrees well with the wealth and treasures surrounding the ruling race under ordinary conditions.³¹

Note 31. The attempt at a restoration made in Pl. 5 in the Antiquities of Athens etc., measured and described by Cockerell, Kinnard, Donaldson, Jenkins, and Railton, does not require mention. Like most productions of the imagination, the conviction is assured that it could not have been so!

Further excavations revealed the stone blocks on which stood the half columns at the sides of the portal, whose dimensions of 1.97 by 1.12 ft. were recently measured by me, agreeing with the representations in the account of the discovery.³² The decorated fragments previously found and designated as bases could not be placed on them, because considerably larger. This fact and also the place for the architrave made on the abacus (formerly the plinth) as well as various arrangements for fastenings on the portal and on the fragments, sufficiently prove that we here actually have to do with the fragments of a capital, which together compose a form of capital similar to that

on the column of the Gate of the Lions.

Note 32. See Thiersch. Die Tholos des Atreus zu Mykenä. Mitt. d. Kais. Deutsch. Arch. Inst. Athens. 1879. pp. 177-182, Pls. 11-13. (Used for Figs. 26 and 27).

Fig. 27 gives a representation of the arrangements for the fastening and of the portal in general. The shafts of the columns must have here extended only to the fastening in the 3 d course from the ground, a condition similar to that preserved at the Gate of Lions, and which, with its very moderate diminution downwards, appears acceptable. A separately treated pedestal must have formed the foundation between the 3 d course and the ground stones (supporting blocks), indeed in the same form as on the Gate of Lions.

Besides the discovery of the bases, four more fragments of the capitals were found, in addition to those known and dispersed, one of which we reproduce from the original piece in Fig. 28.

Note 33. Now in the Grand Ducal Collection at Carlsruhe.

40. In Athens is now a triangular slab of red porphyry decorated by two horizontal series of wave scrolls, whose points fit accurately in those of the enclosing triangle; also of the same material, a slab 2.89 by 1.38 ft. with 3 rows of similar ornaments, and two fragments of slabs with fan-like decorations on the narrow sides. Also a fragment of the shaft of a half column of greenish stone, like the capitals, a larger number of inlaid pieces with ornaments of white stone, and a fragment of a slab of bluish-gray stone with wave ornaments, other fragments are to be found in London and Munich. The holes for the cramps on the side next the entrance and the marks of cramps on the inlaid pieces prove the veneering of the part of the wall above the lintel of the doorway, and the pins and pin holes of the fascias of the opening for the door, the veneering of the door frame.

Notwithstanding this material, a satisfactory restoration of the exterior has not yet become possible. But the great tholos did not serve as a sepulchre; this was rather a small adjoining rectangular room, connected with the preceding one by a doorway, whose lintel was relieved from its load, like that of the main portal (Fig. 29). The room is now without decoration, roughly cut in the rock, but must have formerly possessed ornamentation on walls and ceiling.

Not far from the Gate of the Lions is a second and smaller wholly structural Treasury of only 34.45 ft. lower diameter. The upper portion of the apartment has fallen in; the blocks lie on the floor and permit the jointing and dressing of the separate ashlar to be accurately recognized; vestiges of a former bronze covering of the interior are not preserved. Schliemann found a fluted half column³⁴ about 4.10 ft. high and 1.31 ft. diameter near the entrance (the entire passage way has not yet been cleared), while the door has a clear height of 18.04 ft. In the rubbish lie fragments, 0.66 to 0.75 ft. in length, of a decorated frieze of blue and white marble. From these finds of the remains of ornamentation, insufficient as at the Treasury of Atreus, we may conclude the external decoration to have been similar to that previously described. An additional chamber does not exist, like that at the great Treasury; the triangle over the lintel is also without decoration. Fig. 29 gives a representation of the coursing of the ashlar of the vault and of their size.

Note 34. According to scratches on the wall, the shaft increased in diameter slightly upwards. The slabs above the columns bear disk ornaments, as at the Gate of Lions.

41. Other domed tombs, four in number, lie on the western and northwestern slope of the hill of the city, and whose vaults have likewise fallen. A fifth, therefore making seven in all, was also found in the vicinity of the common burial place of the city.

Besides these, five other domed tombs have become known in Greece; near Menidi, at Orchomenos and Pharis near Amyclea, near the Heraion south of Mycenae, and near Vols in Thessaly.

30. Domed Tomb in Orchomenos.

Pausanias mentions the Treasury of Minyas at Orchomenos, i. e., a domed tomb there, as a remarkable work. "it is a circular structure, somewhat depressed-pointed at its apex; the topmost stone is said to hold the entire structure together", which was not exactly the case. Also placed at the foot of a hill, like the Tholos of Atreus, this wonderful domed tomb of antiquity, the Tholos in Orchomenos, is now half destroyed. It consisted of a large circular apartment, the dromos, and an adjoining rectangular chamber, which was built of green slate,

whose quarry has been located in the vicinity of Lebadeia. The dimensions of the entrance doorway were almost exactly the same as in Mycenae, and the diameter of the domed interior is only 3.28 ft. less than there. Eight courses above the floor and entirely preserved, and 12 are partially so. Above the 5th course, almost every other stone shows preparations for fastening metallic decorations, which also extend over the architraves of the small sepulchral chamber.

Note 35. Fig. 30 is a facsimile reproduction from Schuchhardt, Plate opposite p. 340.

The holes and bronze pins there form a continuous system of five points at which bronze rosettes may have been fixed.

The chamber was sunk downwards into the rock like a shaft; the walls were covered by masonry, and the ceiling was composed of slate slabs 0.98 ft. thick resting thereon, which were decorated by a sculptured spiral pattern enclosed by a border of rosettes, and by an inserted central panel (Fig. 30). But the walls were covered by marble slabs similarly ornamented, whose decorations and those of the ceiling slabs were borrowed from tapestry work, and are nearly identical with those of Egyptian paintings on ceilings.

31. Domed Tomb near Menidi.

The domed tomb discovered near Menidi³⁶ is built of courses of quarried limestone blocks, which are irregular, only being roughly dressed with the hammer, and are set on each other without mortar, but well chinked with spalls. The diameter of the Tholos is 27.5 ft. with an original height of 29.5 ft. But the entrance doorway is constructed of more carefully dressed stones of larger dimensions, and a peculiar mode of relieving the lintel was attempted by anchoring together the obliquely inclined walls by bond-stones (Fig. 31), and this is to be considered. A dromos 9.85 ft. wide and 91.0 ft. long leads to the entrance doorway, just as for the Tholos of Mycenae.

Note 36. See Lolling, Bohn, Furtwangler, and Köhler. Das Kupfelpelgrab bei Menidi. Pub. by Kais. Deutsch. Arch. Inst. in Athens. Athens. 1880. Tech. Theil. pp. 45-47, pls. 1, 2.

32. Domed Tomb near Dimini.

The same construction is shown by the domed tomb near Dimini³⁷, located one hour from Volos. A circular stone slab here serves as

the keystone of the tholos, and is 4.72 ins. thick and 3.67 ft. in diameter. The height of the domed chamber is 29.5 ft., its lower diameter is 27.9 ft., and the height of the entrance doorway is 11.8 ft. The agreement in the ratios of the domed tombs described is striking.

Note 37. See Mitt. d. Kais. Deutsch. Arch. Inst. Athens. 1886. pp. 435-443; 1887. pp. 136-138.

33. Tumuluses.

Homer speaks of another kind of sepulchral monuments for his heroes; these are colossal mounds of earth, frequently on a stone substructure and intersected by dividing walls, the Tumulus, such as still exists at Sardes on the Sea of Gyges, and on the hill terrace of ancient Smyrna and in other places, as memorials visible at a great distance.

"But they mass the monument in a circle, lay the stone base around the fire, and heap the shot earth up into a hill".

Hector's bones were placed in a golden box in the hollow grave beneath the stone cairn and covered by the pile of earth.
43. Patroclus' white bones were collected from the funeral pyre, placed in a golden urn between two layers of fat, and the mound was then thrown up; to Elpenor, "we heaped up a tomb, placed on its top a pillar, then fastened on high the finely polished oar".

Telemachus also thought of piling up a memorial to his father on rocky Ithaca. 34. *Pit Tombs.*

Another form of sepulchre of the heroic period was discovered by Schliemann near the walls of the citadel in the vicinity of the Gate of Lions at Mycenae, the so-called pit tombs. The narrow surface of the rock between the cyclopean walls of the first and second enclosures of the citadel, which is steeply inclined, was covered with earth, leveled, and supported a double series of vertical stone slabs set in a circle and of horizontal uncovered stone slabs. This ring of stones is about 88.58 ft. in diameter, with a narrow entrance on the north; at its centre stood a series of sepulchral slabs, some of which are decorated by reliefs (4 sculptured and 5 not sculptured were found, with a great many fragments of others). Beneath them and deep beneath the layer of earth were 5 sepulchral chambers of oblong form and cut in the solid rock, to which a sixth was la-

ter added, their average length and breadth being 19.69 and 9.84 ft. Within these were the skeletons of 12 men, 3 women and 2 children, lying on pebbles, among which numerous remains of food were to be found, and covered by a layer of clay, pebbles and earth.

The walls of the tombs were lined with small quarried stones and they were covered by slabs of shell limestone, which rested on wooden beams, whose ends were covered and protected by shells of sheet copper. The edges of the shells were hammered together and fastened to the wood by means of copper nails.

Crowns and diadems of gold with stamped ornamentation lay on their heads, and golden masks covered the faces; golden shoulder belts, bronze swords with golden handles and inlaid work, rings, golden vessels, silver cups, head-bands, golden ornaments for greaves, beautiful wooden buttons overlaid with gold plate, bracelets, idols, copper kettles made of plates riveted together, ornaments of rock crystal and amber, an alabaster vase, an ostrich egg with overlaid dolphins, Egyptian porcelain, etc., were near the dead, these objects now filling an entire hall of the Polytechnic School on Patissia St., Athens, really one of the most interesting collections in the world. The ostrich egg and the porcelain indicate very ancient commercial relations between the inhabitants of the Argolic plains and Egypt; the golden masks point to Asiatic as well as Egyptian customs. The latter have already been found in Babylon (now in London), in Memphis (now in Paris), on the coasts of ancient Phoenicia, opposite the island of Aradus at Byblos, the city of the stone-cutting Giblites, the supporters of the great Phoenician ashlar style, the city of Zenobia on the Euphrates, in Kertch, in Olbia, and a bronze mask at Nola.

On these ornamental objects, the Phrygian style of decoration plays an important part, and all elements of assuredly Mycenaean³⁸ pieces of ornamentation are shown in Asia Minor.

Note 38. See Hilckhöfer.

35. Pyramids.

Here should also be mentioned the ruins of the Pyramid of Cenchrea,³⁹ which is built of great polygonal blocks, partly with the use of mortar (the latter perhaps to be referred to a mediaeval restoration?). The plan forms a rectangle of about 49.2 ft.

long and 39.4 ft. wide; three sides are well preserved to a height of about 9.84 ft., while the fourth (western side) is greatly injured; at the eastern side is an entrance, through which one enters a narrow passage and from this the true internal chamber, about 62.3 sq. ft. in area, which was originally divided into two rooms. Whether this almost unique building in Greece was a sepulchral and victory monument (the so-called polyandrium) or a wathctower, or the like, is yet in dispute.

Note 39. See Lolling in Baedeker's Greece. Handbook for Travelers. Leipzig. 2 d Am. edition.

36. Cities and Dwellings.

The wealthy city of Corinth, well built by the high minded Erechtheius, has now disappeared, together with the beautifully built Cleona, the strongly walled Tiryns, and Mycenae, the city filled with distinguished houses; only scanty vestiges now mark the dwellings of the citizens in the cities of which Homer sung. a poor piece of well jointed ashlar masonry from which gushes a water course, and an overhanging figtree in an elevated, grand, and peaceful country, mark the location of Cleona; the lower city of Corinth has been swept from the earth by war and earthquakes. Many vestiges of the city walls of Mycenae have been recognized, though but extremely slight, and these show that but a portion of the lower city was surrounded by weak enclosing walls, while the greater portion was terraced and adjoined the higher fortified city as a solidly built suburb, to which the inhabitants retreated in case of attack, with their wives, children, and property. The principle of a fortified higher and an unfortified lower city was almost generally adopted, and it was retained with modifications until the later period.

On the western, southwestern, and southern slopes of the rock of the citadel are still pointed out numerous ruins of cyclopean structures, some with considerable dimensions (88.58 and 59.05 ft), the sites of former dwellings, and also perhaps of public buildings and sanctuaries, mixed with the remains of cyclopean retaining walls. The houses were mostly simple and treated without decoration, placed on a firm substructure of ashlar, and were built of burned, or frequently of merely sun-dried bricks, as still customary in the Argolic plains. The plan and subdivision of the private houses of the heroic period is unfor-

unately lost to us; they must have always been quite simple, since about 514 B. C., even the city of Athens was described as close, dirty, and uncomely. The house of a Themistocles or of a Miltiades was small and modest;— but there must have been a great many more requisites wanting 600 years earlier.

We likewise know in reference to other cities, that they were not compactly built; thus Sparta consisted of 5 districts without walls, "not distinguished by temples and costly structures, but composed of several villages, in accordance with the ancient Grecian manner of building cities". (Thucydides). The houses were rudely constructed; according to the laws of Lycurgus (880 B.C.), no tools other than the axe and the saw could be used in the fabrication of ceilings and doors. Two kings, Leotichides and Agesilaos, though certainly not without a sneer, could ask about 480 and 380 B.C., whether trees grew square in that country, when they saw the carefully carved wood-work in the house of a foreign host.

37. Most ancient Religious Monuments.

Few are the vestiges of monumental places for the worship of the Deity or of religious monuments during the heroic period (Altar of Zeus Herkeios in the court of Tiryns and on the Acropolis of Athens), or during the first century thereafter.

45. "The nameless and impersonal deity of antiquity" required no house; the worship was seldom a common one of a united people, and neither now nor during the best period, after the creation of entirely personal deities, was this worship performed within closed rooms.

Trees, rocks, fountains, etc., were symbols of the deity, or sacred places to which men reverently drew near. The later deity became personal later and was first revered in formless images, which were placed beneath the open sky, in caves or sacred trees, at all times being accessible to believers for prayer and comfort of soul. An image of the deity, still lacking art, an uncut stone in accordance with ancient custom, is Pausanias' description of the idol later placed in the Temple of Hercules at Hyettus. The very ancient image of Eros at Thespia consisted of an uncut stone, and the highly venerated Charites in the Orchomenos are rough fragments of stone fallen from heaven for Theseus. The image of Artemis Kedreatis at the same place stands

at the same place stands in a great cedar, and the ancient image of the Ephesian Artemis is in the hollowed trunk of an elm. In Sparta, two beams connected by transverse pieces of wood represent the Dioscures, and a phallus on the hills of Cyllene represents Hermes; the image of the deity at Amyclea is "old, without art and like a bronze column".-- Such idols of perishable materials required protection from wind and weather and exhibition under cover, as seen in case of the images of Artemis; a canopy-like protecting roof supported by columns, the simplest and most natural arrangement affords this protection. The ancient sacred wooden pillar of Oenomaos was protected by a roof borne by 4 columns; the roof supported by wooden columns, or the Sanctuary without walls on the market-place of Elis, the prototype of the later columnar temple, actually served for similar purposes. An increased protection was afforded to the sanctuary and the gifts by enclosing the place of exhibition by walls, or the cella of masonry, which received its light through the great doorway. To develop these architectural ideas and to express them in monumental form was postponed until the succeeding period.

38. Development.

After the Trojan War, many changes of habitation and settlement occurred in Greece, so that the country could not develop itself peacefully and prosperously.

The long absence of the princes and the warriors from their domestic hearths during the Trojan War afforded fine opportunities to ambitious men remaining at home, for creating complications of all kinds, which required bloody solutions. Transfers of possessions, emigrations and immigrations followed the bloody drama; thus in the "eightieth year" after the fall of Troy, the Dorians united with the Heraclides and took peaceful possession of the Peloponessus.

The more numerous changes occurred in the inhabitants of the most fruitful portions of the country, in Thessaly, Boetia, and a part of the Peloponessus, Greece only painfully attaining to peaceful and orderly conditions, which were first enjoyed by Attica, in particular. On account of its sterile soil, this region was generally from the earliest times free from commotions, and the Athenians proudly called themselves "autochthenes" or aborigenes, the most ancient people, "who alone of all the Greeks had not changed their abiding place". Thucydides sees in this one rea-

reason for the high eminence of Athens in comparison with the other states. Men of importance appear as lawgivers in the different states, arrange public affairs, and prosperity increases after more quiet conditions prevail. Fleets are built and colonies are sent forth, and in this way the Athenians peopled the Ionian territory and most of the islands, but the Peloponessians settled Italy and Sicily. (See Thucydides). The stream of the race, originally flowing in past times from east to west, turns back towards the east; Moreover, the Trojan War is already regarded as an abortive effort of civilization directed eastward.

At about this time, the names of "Hellas" and "Hellenes" may be applied to the entire native land and to the people allied by descent, as Homer lived after the Trojan War and used this as a general designation of the Danaides, Argives, and Achaians.

The Athenians were also the first people to assume a more comfortable mode of life and to give up the barbarous custom of bearing weapons, resulting from the insecurity of previous conditions. The Olympic Games were instituted 776 B.C. as an expression of the national unity; we find Grecian colonies and mercenary soldiers in Egypt in 670; about 600, Grecian colonies extended from the Black Sea to the western Mediterranean. Even the northern coast of Africa received a Grecian colony in the founding of Cyrene by Battos.

These colonies were not mere trading stations, as with the Phoenicians; they were the means of furnishing new and better abodes for the increasing population of the mother country.

The Aeolian, Ionian, and Dorian colonies in Asia Minor soon excelled the mother country in the development and fostering of the fine arts, exerting no unimportant influence upon them. The 12 cities of Miletus, Myus, Priene (in Caria), Ephesus, Colophon, Lebedos, Teos, Erythrae, Clazomena, and Phocaea (in Lydia), and the island cities of Samos and Chios, attained to wealth and consequence, aroused the jealousy of the Lydian princes to whom they paid tribute, and who were otherwise not averse to the Greek race. (617 to 564 B.C.)⁴⁰ By resisting these princes, Miletus lost its Temple of Athena but received two others, built anew by Alyattes. The art-loving and wealthy Croesus gave golden cows to Ephesus as sacred gifts, together with most of the columns of the temple; he sent to Delphi 117 golden half

tiles, on each of which a golden lion was represented, a silver mixing vase and one of gold, the former containing 600 amphorae, 4 silver casks, sprinkling vessels of silver and of gold, articles of cast silver, and a golden female figure 3 ells in height, with the golden weapons dedicated to Amphiaurus in the Temple of the Ismenian Apollo at Thebes (which were even seen by Herodotus), and also sent to the Spartans the gold for the statue of Apollo on the Thornax in Laconia.

Note 40. For example, Croesus had concluded with Sparta an alliance of hospitality and of arms.

After the collapse of the Lydian kingdom, the easy yoke of the Lydians was replaced by that of the Persians under Cyrus. The cities of Magnesia and Priene were ravaged by Mazares, and Phoea was taken in spite of its excellently constructed wall, composed of huge stones. Under the rule of his successor Darius occurred an insurrection of the Ionians, with the aid of Athens and projected by the Milesian Aristagoras, which laid in ruins Sardis, the seat of the satrap Artaphernes, the former capital of Croesus, most of its houses being constructed of reeds, or of unburnt bricks with roofs of reeds. A Temple of Cybele was thereby destroyed, and this occurrence was later utilized by the Persians as a basis and justification for the destruction of Grecian temples by them. Miletus was retaken by the Persians, and the Sanctuary in Didyma with the Temple and the Oracle were sacked and burned. The Persians equipped themselves for an avenging campaign against Athens, which had meanwhile taken a magnificent course of development under the rule of the art-loving Pisistratides. The market-place was laid out, the Acropolis was adorned by magnificent buildings, and the great Temple of Zeus was commenced (538-510 B.C.). Slight differences between the Grecian states at this time did not directly obstruct the development of the arts and sciences.

Under the lead of exiled Greeks, the Persians invaded Greece in 490 B.C., laying waste the territory of Eretria, plundering and burning in retaliation for the fate of the Temple at Sardis, until they were compelled to retreat after being vanquished on the field of Marathon. Athens was saved for the time. Ten years later, Xerxes crossed the Hellespont into Europe with an imposing array, first entirely overrun Phocis, burned villages, and per-

mitted fire to be thrown into cities and temples; the wealthy Temple of Apollo at Abae was thereby destroyed, together with its treasures and gifts.

Near Panopeus the army divided in two parts, the larger marching with the king towards Athens; the other proceeded on the road to Delphi, laid in ashes the cities of Panopeus, Daulis, and Aeolida, while Delphi itself only nominally escaped by means of miracles and the action of the elements. Accompanied by thunder and lightning, a block of stone broke loose from Parnassus on the appearance of the barbarians and rolled down upon the rushing hordes, who shrieked and fled before the wrath of the deity!

Thespia and Platea were burned, the abandoned lower city of Athens was destroyed, the temples were sacked, and the Acropolis and its sanctuaries were then set on fire. "After the departure of the Persians, but little of the enclosing walls remained standing; the houses were mostly destroyed, excepting a few, that had been occupied by distinguished Persians". The day of Salamis (480) put an end to this work of destruction also; the remains of the Asiatic invasion left Grecian soil a year later, after a bloody overthrow at Platea (479). On the same day as at Salamis, the Carthaginian attack on the Grecian cities in Sicily failed; Gelon broke the power of Africa at Himera.

No abundant materials now remain to us from the architectural works of the period preceding the oldest stone temples on Grecian and Italian soil; many gaps are to be specified before the masterpieces of the 6th century. If the discoveries in Mycenae and Tiryns, in Troy and Olympia, have even extended our knowledge of entire species of buildings of the early period, we are still not in a position to correctly state the construction and arrangement of the temples of the earliest period, in all respects. And if we base hypotheses on the trunks used as columns, the substructure, and the few remaining courses of stones of the Heraion in Olympia, whose purport extends back into the 9th and 10th centuries B.C., no positive representation results.

The public and private life of the Greeks may still have been simple at the time of the carnage at Platea and opposed 48. to the arrangements of the splendor-loving and wealthy Asiatics. Pausanias, the general, was amazed by the tents of his

antagonists, the couches overlaid with gold and silver, the golden mixing vases and vessels, the sacks filled with gold and silver cups, by the table of gold and silver, and all the splendor of the meal. He therefore ordered the preparation of a Laconian (Spartan) meal, called the leaders to him, and said: "Ye Greeks, I have assembled you together, since I desired to show you the indiscretion of the Median general, who led such a magnificent life, and yet came to us, to deprive us of the poverty in which we live". The simplicity of the dwellings has been previously mentioned; we should not forget here that the Greeks were a free people, jealous and suspicious to an extreme, inclined to criticism, and economical with their money. No citizen dared to make a display of his opulence, so as to wound the democratic spirit by visibly luxury, which would at best have produced envy and malevolent suspicions. Alcibiades was the first to have the interior of his house painted.

The treasures and slaves of Egyptian and Persian kings were not at the disposal of the Greeks; they had no servile populace for the construction of their works, they sought to attain superiority by means of beauty and choice of form, which must be conceded to their art works. Thus they avoided in their buildings a multitude of architectural motives, an overloading with ornament, and an accumulation of surprising details; simplicity was the supreme law in the temples, the public buildings, and in the dwellings. The workmen were proud of their works and viewed them with self-consciousness. To these conditions, which certainly sometimes extended beyond endurance, is due the faultless execution of most Grecian works.⁴¹

Note 41. See Viollet-le-Duc. Histoire de la Habitation Humaine. Paris. 1875. Also in English.

Religious sentiment and faith were firmly rooted in the people before and during the best period, although the cultured rulers could with greater freedom consider the deities as being affected by all the deficiencies and preferences of the national character of the Greeks. The faith of the people in the deity and a consideration of this made it possible for the Pisistratides, for example, to execute their designs in Athens. "A woman of the Paean district, almost 4 ells in height and of mag-

nificent development" and sheathed in complete armor, was placed in a chariot followed by the Pisastratides and ~~their~~ adherents; heralds cried out that this was Pallas Athene, whom Pisastratus was bringing back into the city; the people believed, worshipped her, -- the plot succeeded.

The Greeks exercised great care in the service of the deities; it was therefore strictly prescribed that the sanctuary should not be desecrated. Intercourse with women within the sanctuaries, or to visit them when not purified, was not permitted. Egyptians and Greeks were governed by similar laws in this respect, while almost all other nations of the world then known, permitted to men within the temples of the gods and in the sacred enclosures the same freedom as to animals.⁴²

Note 42. See Herodotus.

If the gods were considered as righteous and perfect beings, their earthly priests were somewhat pliable. By money, the decision of the god could be determined in favor of one party. ⁴⁹ The Alcmaeonides, who fled from the Pisastratides, constructed the facade of the temple of Parian stone instead of the tufa agreed upon, in order to win the oracle to their purpose, and attained their end by the additional expenditure; seven Persian gold was not disdained, and the national welfare was subordinated to gain, -- the oracle rather intimidated the Athenians than inspired them to a war for freedom. The gratitude of the king for their good service perhaps protected the Delphic priests more than the alleged and dubious miracle.

Free from the distresses caused by the barbarians, the Grecian race in the mother country and the colonies breathed again, and under the leadership of highly gifted statesmen, the arts and sciences commenced a flight never anticipated.

39. The Best Period.

The conditions continually improved, Athens became the head of the Grecian states, and it especially showed by the magnificence of the public buildings then erected, that its much discussed power and its ancient prosperity were not fabulous. The high minded Pericles, "The Olympian", assumed control of the state policy of Attica; a sufficiency of means was found, and the city was properly provided with all the requisites for a war. Therefore, he believed that he ought to employ the sur-

plus means for objects, which would the more receive eternal fame after their completion, as they would be a source of prosperity during their construction.

He thus assumed the execution of a grand design without delay and artistic plans for works employing the people for a long period. The building materials were provided, as Plutarch states, stone, metal, ivory, gold, ebony and cypress woods. The tradesmen required for their working and preparation were also found, such as carpenters, sculptors, smiths, stone-cutters, dyers, workers in gold and ivory, painters, embroiderers, as well as the laborers necessary for the conveyance and transportation of all this; pilots, sailors, and customs officers on the sea, wagoners, horse leaders, drivers, rope-makers, linen-weavers, saddlers, road-makers, and miners. Finally, to each craft was added a multitude of assistants of lower grade to almost supply the place of mere tools by manual labor. In such a locality, all these requirements, so to speak, diffused and scattered an abundant prosperity among every age and every capacity.

The works rose gradually, as magnificent in their dimensions as inimitable in their form and beauty. All masters strove to excel the work of the craftsmen by skilful execution. Still, the rapidity deserved the greatest admiration. Structures, which it might be believed could only be completed during many generations and human lives, toiling for a single end, these were all completely finished during a single administration.

From the beginning, each work equalled the models of antiquity in beauty, while it is today fresh and living in its blooming grace. Hence a kind of veil of eternal youth rests upon it, protecting the general appearance from every touch of time. It is as if these works were imbued with the breath of a perpetual Spring, a soul that can never change! The Parthenon, erected by Iktinus and Callicrates, the Temple of the Mysteries at Eleusis, commenced by Coroebus and completed by Metagenes and Xenocles, the long walls of Callicrates, the Odeion, whose external form was an imitation of the tents of the Persian kings, and the Propyleion, built by Mnesicles, are all works of this period. The great Phidias, the friend of the "Olympians", created the golden statue of the goddess and managed the entire undertaking; these made Athens a great city, one of the great-

est and wealthiest; through this it became the school of culture for all Greece, and even for the entire world. The power and wealth of Athens served Art first of all; during the 20 years immediately preceding the Peloponessian War, the little state of Athens expended at least 8000 talents or more than \$10,000,000 for works of architecture and sculpture. "But, had these sums not been spent at that time, when every element existed requisite for the production of perfect works, this moment could never have returned".

Not alone in the mother country, but in the colonies as well, pulsated a new and active art life. Sicily fostered architecture above all else during the period from the fall of the Tyrants until the second invasion of the Carthaginians. The construction of temples commenced under the Tyrants with great zeal and was continued in accordance with the progress of art development, even larger and more beautiful structures being erected. A large part of the temples and aqueducts at Syracuse, Akragas, Selinus, and Himera, originated between 480 and 450; the oldest Temple in Selinus perhaps about 600, the latest at Egesta shortly before the invasion of the Carthaginians in 410 (if Holm be incorrect as to the possibility of its erection just previous to the destruction by Agathocles in 307). Of these, the Temples of Olympian Zeus at Selinus and Akragas belong with the largest of ancient times; neither was ever completed, and their dimensions were only exceeded by those of the Temple of Artemis at Ephesus. "They built as if they were to live forever, and ate as if they were to die next morning---- in the most beautiful city of mortals". In the Temples at Paestum, and in the ruins of the Temple at Lokri, the Italian colonies gave magnificent proofs of their activity in art.

The vestiges in stone of a revival in the country of Asia Minor, crushed by the war, and in the islands, are less common. The national sanctuary of the Ionians, the Artemesion at Ephesus, was spared by the Persians, and only the Temple of Miletus was rebuilt after the slaughter of the Persians, as an important monument, the Temples at Sardes, Priene, Magnesia, Teos, etc., belonging to the 4th century or later. What remains to us of all this magnificence? A considerable amount, considering the length of time elapsed from Pericles till our day, and still

too little to afford an authentic representation of an antique temple with all its peculiarities. Although the plans of individual monuments are determined by repeated measurements, and the detail forms are known by drawings of all kinds, the desired starting points in the structures themselves for certain structural arrangements are wanting, such as the ceiling of the cell and the construction of the roof of the temple. Opinions differ very greatly in reference to these arrangements and must so continue, until a fortunate accident places more tangible memorials in our hands. Whether this chance can ever occur in case of the known monuments in their present condition may be strongly doubted. Even the soil of Olympia afforded no answer in this respect to the questions relating to this topic.

57 The various attempts to restore the antique temple in its original form, or the discussion of the kinds of temples, their lighting, and the construction of the roofs and ceilings of temples, are and must remain for the most part hypotheses more or less ingenious, which may or may not be believed; none of the theories advanced can be said to be indisputable or established. Under these circumstances, the fact longest known requires no confirmation, that our knowledge of Grecian architecture is a limited one; also that the most thorough new work upon all measurements and drawings (of which quite good ones exist), and the most extended and careful researches would fill the void as little as would Structural-esthetical-historical attempts! We are indebted to numerous detailed publications in recent times for explanations of the present condition of the monuments, and which with many worthy publications also taught us to distinguish truth from fable, and to improve many defective forms of detail, academically accepted; but these give also no information in regard to what is irrecoverably lost. But even the number of years occupied in the construction of most monuments is known to us and attested by documents, and we must also be here satisfied with approximations.

The best preserved Doric monuments are the marble Theseion and Parthenon at Athens, the so-called Concordia Temple of limestone at Akragas, which afford definite explanations in regard to the arrangement and construction of the external details of the structure and the ceiling of the porticos; the Temple of

Poseidon at Paestum, which represents the formation of the interior, the arrangement of the aisles, the small columns placed above the others, only leaving unsolved the questions of the ceiling and of the lighting. Nearly all others have been sacrificed to the power of the elements and the lust of mankind for destruction, more or less doubtful remains now alone existing. We rely upon this material during the following discussions.

40. Decline and End.

The resources and taste for monumental art were weakened by pestilence and war, by the foreign and internal commerce of the individual states, and by the fatal strife between Athens and Sparta, which continued for nearly 30 years (431 - 404) with varying fortunes, terminated by the overthrow of art-loving Athens, and which consumed the marrow of all Greece; the people, that had once performed the greatest achievements, were "loquacious and avaricious, corrupt and cowardly"; their freedom was buried on the day of Cheronea (338). In the dazzling appearance of Alexander (336 - 323), Grecian genius flamed up again and produced in Asia art works full of importance and of noble beauty, but which lack the chaste air and pure charm of the works of the era of Pericles. Under the patronage of the Tyrants (406 - 365), the arts and sciences flourished in individual localities in Sicily; the noble Timoleon (344) created orderly conditions favorable to architecture, but the people no longer possessed any firmness and fell under the rule of foreigners. The Romans firmly seated themselves in Sicily in the year 264.

In place of Athens, Alexandria became the chief seat of Grecian literature and art; under the vain and splendor-loving princes of Pergamos, who were yet imbued with a love of art (241), Grecian art lived through a revival, eloquent proofs of this being given by the finds recently deposited in the Museums of the imperial capital of Germany (best period 241 - 138). Greece came under Roman rule in 196, and the political and artistic originating power of the race was thereby destroyed. The art colonies, Corinth (146) and Athens (86) were taken and destroyed, and Asia Minor was declared a Roman province; (64); the art works of Greece were transferred to eternal Rome as articles of booty.

Fulvius Nobilior dragged 785 bronze and 230 marble statues out of Aetolia; Aemilius Paulus employed 250 wagons for carrying the

stolen statues and paintings in his triumphal procession; Sulla even transported individual columns from the Olympeion to Rome.

These art treasures and the Greek captives interned in Italy gave the first opportunity for the extension of the Grecian art style in foreign lands.

"Yet conquered Hellas subdued the savage victors and brought 'Art to Latium'".

Through the favor of Hadrian in 117 to 138 A.D., Athens and the cities of Asia Minor shone with a renewed, though a transitory lustre, then falling into oblivion, to lend a purifying and renovating force to modern art after the excesses of the 17 th and 18 th centuries.

53.

A. THE GRECIAN TEMPLE.

41. General Remarks.

The works of every people in the domain of architecture, sculpture and painting, possessing the greatest importance, culminate in the monument consecrated to the worship of the Deity; the artistic idea is most intellectually developed and refined in these, and the expression of form is most complete. Therefore, we must develop and study the system of Grecian architecture in them.

As already stated and will again be shown, Grecian art stands on the shoulders of oriental art (Egyptian and Asiatic). Reminiscences of the East reecho throughout the plan of the Grecian temple. Thus the most ancient temples of Sicily (4 temples in Selinus) exhibit the much elongated form of cella, longitudinally divided into three apartments, the vestibule, the holy place, and the most holy place, as in the Asiatic temples of the Deity; excepting that the most sacred place is not surrounded by additional rooms or wholly withdrawn from the view of believers. The porticos, which surrounded the courts, are now directly attached to the temple, that forms a great protecting roof supported by columns, a monumental canopy, "the most ancient symbol of terrestrial and celestial supremacy", which extends uniformly over the portico, the cella, and the statue of the Deity.

The modest temples, whose mode of construction is not stated by Pausanias, nor whether they were Doric or Ionic, were indeed not very different from the usual dwellings of men, whose good and bad peculiarities, manners and customs, hates and loves, continued with the gods, who had become personal.

The walls of these buildings were constructed in the simplest manner, and only in one end wall was placed the great entrance doorway, extending almost to the ceiling, which from this ratio of dimensions, must have had a purpose other than that of admitting visitors, for which smaller dimensions would have sufficed. (Compare the doorways of the Gothic cathedral with reference to the capacity of the interior, remembering that in this case, the sanctuary must accommodate numerous worshippers).

Besides the closed vestibule also occurs the open one. Antae then terminate the side walls, which retain their original extent; the transverse wall and its doorway are replaced by columns, the

principal entrance doorway then being placed in the division wall, which formerly enclosed the sacred place. In another change of the plan, the third division of the cella, or the most sacred place, disappears, giving place to an open rear portico. The statue of the deity retains its position in the cella enlarged in this manner; the personal deity becomes nearer to man. (Compare the "Theseion").

There was sometimes added to the temple cella, as in the Parthenon, an additional apartment accessible from the rear, and which must have served as the treasury of the state, under the guardianship of the deity. The formerly unbroken interior was then divided by colonnades placed in it, one above the other and separated by a simple architrave, i. e., the cella was divided into two narrow side aisles and a broad central aisle. The interior became in a manner two-storied, and small staircases gave access to the different divisions in the height and to the attic. (Compare Akragas). In a further state of progress, the side walls of the front and rear porticos recede, then projecting but slightly beyond the walls containing the doors; the earlier wall and doorway is replaced by antae and columns and is changed into a complete colonnade. (Compare the Parthenon). A still more important enlargement of the cella finally led to the pseudodipteral temple, to a plan like that of the Temple of Zeus in Akragas.

Neither in the most ancient monuments nor in those of the best period is the colonnade anywhere dependent on the cella; the antae do not range with the columns of the portico, nor do these range with those of the pronaos or opisthodomos; the ceiling beams appertaining thereto are arranged just as independently without reference to walls or columns of stone temples.

The new idea, which is always expressed in the structure of the Grecian temple and is in opposition to its oriental kindred, is that of a sacred cella surrounded by columns with the pediment roof supported by columns and standing on an elevated substructure. The immature and rude motive of this form of temple, compared with the Grecian, is already found in one of the species of Egyptian temples differing from the usual type, as in the small Temple at Elephantine; the building then has

in plan the form of an elongated rectangle and exhibits a surrounding row of columns or piers on a slightly elevated platform, up to which a narrow flight of steps leads.

⁵⁵
⁵⁶ The form of pediment facade with antae and columns, which Vitruvius prefers to consider as the most ancient type,⁴³ and which has its motive in the tomb facades of Asia Minor and in the Egyptian grotto tomb of Bein-Hassen, could not have alone belonged to the temple, as is shown by Semper, and is also further proved by the treasuries in Olympia, which mostly have facades with antae and columns.⁴⁴

Note 43. We have designated this as an already more developed form. (See Fig. 22, p. 53).

Note 44. Therefore others also allow the Grecian temple to have originated from the treasury.

⁵⁷ The sanctuaries of the Greeks stand in isolation on steep heights (Assos, Egina), or are surrounded by a sacred wood, are placed on a noble terraced structure, or located in the lower portion of the city (Theseion, Olympeion), or they are frequently grouped on a strictly limited area (Athens, Selinus, Olympia, Akragas); they are often placed in consecrated precincts surrounded by strong walls, access to them being obtained through magnificent portals with porticos, propyleions, and are also surrounded by protecting porticos, treasuries, gifts, etc., often affording security in troublous times to the unwarlike portion of the people and to its treasures.

The temple should produce an effect more by its form than by its masses; I here except the pilgrimage temples, the Artemision at Ephesus, and the two gigantic structures dedicated to Zeus Olympios at Selinus and Akragas. "within exalted, quietly beautiful". They are therefore usually of moderate dimensions, and the cella was almost always accessible to the people, though not intended for the assemblage of a devout multitude.

In the Temple of the birth goddess Eileithya on the Kronion hill at Olympia, any one could enter the front apartment of the double temple, though priestesses alone entered the inner one.

The Temple of Aphrodite in Sykion was only accessible to the female temple servants and to a certain maiden; all others

only beheld the goddess and prayed to her from the entrance.

In a double Temple of Asklepios there, admission to the second part was only permitted to the priests, etc.⁴⁵

Note 45. See Pausanias, Book 6 (Elis, 2 d part), 20, 25.

Thus, for example, the cella of a Temple at Selinus has a width of 24.93 ft. with a length of 39.04 ft.; the centre aisle of the Heraion at Olympia is 91.34 ft. long and but 12.47 ft. wide; the centre aisle of the Temple of Zeus at the same place is 94.00 ft. by 21.39 ft. In the last case, only one-third of the cella was used by the people, since the remaining two-thirds were occupied by the statue of the deity and the tables for garlands. A space for the "people" thus remained here about 21.34 by 31.17 ft., or of 667 sq. ft. in round numbers, a superficial area corresponding to that of a large living room in a modern house.

The centre aisle of the Temple measures:--

Temple on Egina, 10.73 by 12.80 ft., or 449.96 sq. ft.

Temple in Phigaleia, 14.47 by 41.99 ft., or 522.05 ,,,

Parthenon, 32.41 by 83.98 ft., or 2722.20 sq. ft.

In these cases likewise, if two-thirds is reserved for the statue of the deity and the altar, there remains for the "people at Egina and Phigaleia the small areas of 150.70 and 172.22 sq. ft., and in the Parthenon 914.95 sq. ft., or rather more than at Olympia. "Great festal processions" could not occur in these rooms, especially if the space occupied by the numerous gifts be also deducted!

Let us therefore omit the people and the festal processions from the temple, assuming it to have been only entered by individuals, and principally by priests alone, who offered bloodless sacrifices on the smaller altars before the statue of the deity, while the burnt offering occurred on the great altar before the temple (in accordance with Asiatic usage).

57. As correctly described by Vischer, the interior is therefore "a noble and richly decorated apartment for the deity, intended to be seen, the vestibule concentrating the mind of the observer on the whole before his entrance".

In accordance with the dimensions of the ground plan, the measurements of the height of the temple are unimportant. The Temple on Egina measured 34.78 ft. high to the apex of the

pediment, that in Phigaleia 35.76 ft., and the Parthenon 62.66 ft. On a repeatedly divided substructure, broad and quietly coursed, rose the cella surrounded by columns spanned by architraves, followed by the frieze and the crowning principal cornice, the structure receiving its final and expressive ornamentation by the gently inclined pediments decorated by figures. The exterior of the temple shone with rich gilding and with brilliant decorations in color, heightened by metallic accessories, in accordance with the high colors of surrounding nature.

Chapter 1. The Doric Order.

a. Form and Structure of Principal Parts.

1). Enclosing Walls.⁴⁶

Note 46. In the following examination, some of the technical subjects are of a general nature and are just as applicable to the Ionic and Corinthian orders as to the Doric. This will be readily determined in the passages concerned.

42. Masonry.

The enclosing (protecting) walls of the temple precincts and of dwellings are generally carefully constructed of large polygonal or horizontally coursed ashlar without special ornament, or they were built in times of necessity and distress without reference to similarity of materials and jointing. Walls composed of all kinds of stone with here and there a stone entirely uncut and just as it was brought, with many columns for sepulchral monuments and even stones wrought by sculptors built into the walls, -- thus Thucydides describes the walls of Athens, hastily erected after the Persian war, and there is still to be seen in the walls of the Acropolis these hastily constructed portions, intermingled with drums of columns, triglyphs, and fragments of cornices, while the walls around the Piraeus were constructed in the most careful manner. No cementing material, neither lime nor mortar, was employed in them; the large rectangular blocks of cut stone were laid beside and upon each other, the outer ones being bound together by iron cramps and lead.

52 The rudely coursed masonry requires to be built of a considerable thickness in order to possess the necessary stability, while it was coursed in the usual way, immaterial whether horizontal or polygonal, the solidity depending on an exact fitting togeth-

er of the bed and abutting surfaces, and on a carefully bonded arrangement of medium sized ashlar in courses, the end joints not being usually vertical, but at an inclination, as also found in Egyptian ashlar masonry, which may be traced back to 1600 B. C.; yet a characteristic of the latter is the projection of individual stones into other courses, which custom was introduced into Greek masonry of the early period. In Egyptian buildings, the separate ashlar are frequently held together by double dovetail dowells of wood and also by mortar of lime and sand, while besides wooden dowells, the Greeks used those of iron and cramps set in cast lead, but bronze was less frequently employed. The manner of indirectly connecting the ashlar may indeed have been brought to Greece by Egyptian colonists; the principle remains the same in both cases, excepting that the connecting material is wood in the one case, and wood and iron in the other.

The ancient walls of Assos in Asia Minor (Fig. 36), which surrounded the ancient Doric temple, are constructed of low courses of ashlar, carefully wrought on the faces and in the joints; headers and stretchers alternate in a course, so that the headers extend entirely through the wall, but the stretchers do not reach the middle of the wall and leave voids; over the entrance doorways, where the recessed lintel is to be relieved, headers are found in every third course. In other portions of the wall, which have the considerable thickness of 9.35 ft., ashlar facings are arranged on both sides with infrequent headers, but with solidly constructed bonds at angles, so that the middle third of the wall is composed of unwrought material, a mode of construction seldom found elsewhere than in Grecian masonry. This regular coursing, together with the smaller dimensions of the stones, appertains to the later period in Egypt, and always indicates an early one in Greece.

43. Gateways.

The opening of a gateway in regular masonry is usually a vertical rectangle or trapezoid, and it is also covered by a large horizontal stone lintel, while the recess for the gate is semi-octagonal, semicircular, or pointed-arched at top, although the arched form is produced by corbelling out. That the latter may be formed by two concave stones is shown in Akarnanian walls,

(Figs. 37, 39), but at another time it is composed of voussoirs. The spanning of the opening by an arch is an almost natural result in polygonal masonry. Triangular forms produced by corbeling, heads composed of horizontal offsets, or completely equilateral triangular forms of the opening for light, are also found.

42. But pointed and round arched forms of gates occur on the battlemented city walls of Nineveh⁴⁷; arches and vaults were already found in Egypt in the time of Useratesen I (2200 B.C.). A small vaulted tomb existed in the valley of the Queens at Thebes, whose arch bore an inscription in which Amenophis I occurred; another tomb exhibited the name of Thothmes III (1597 B.C.). The entrance to one of the Ethiopian pyramids is vaulted in the form of a depressed arch; the stones are cut as voussoirs and the joints are filled with fine cement and stone chips. Hoskins considers these pyramids to be more ancient than those in the valley of Egypt; hence the arch dates back in Egypt before 3000 B.C. The Chinese assert that they have possessed it from time immemorial.

Note 47. See Layard. Nineveh and its Remains. Vol. 2. London. 1849.

6. The invention of the arch cannot be ascribed to any particular people with certainty; it may have been made by different nations at the same time in different localities; in countries possessing but little wood, or where large blocks of stone were quarried, and men were required to construct a firm protecting ceiling with small pieces of stone, the inventive genius of mankind must then have led to similar results, for necessity is indeed everywhere the mother of invention!

The Etruscans were the first European race to introduce a frequent use of the arch in its buildings, while it was scarcely used by the Greeks, or at least was not accepted as a motive in their architecture, although known to the Egyptian and Phoenician colonists, who immigrated into Greece, and the Greeks must have later seen it among neighboring peoples.

Defensive walls constructed in accordance with Egyptian rules (horizontal courses of trapezoidal ashlar), or after Phoenician rules (polygonal ashlar like those of Tiryns and Argos), are quite extensively found in Greece and are contemporary. Notable in many cases is the double rebate form of the angle of two portions of the wall intersecting at right angles.

Considerable remains of these walls are found in Greece in addition to those already mentioned:--

218. On Ithaca, -- like that at Tiryns.

On Cephalonia, -- polygonal arrangement.

In Buphagion, -- courses more nearly horizontal, with projections of the ashlar into other courses.

In Paos, -- the same.

In Elateria, -- polygonal and rather nobler than at Tiryns.

In Cortynia, -- arranged more nearly horizontal.

In Psophis, -- almost entirely horizontal.

In Oiniadai, -- horizontal courses with oblique end joints.

In Aiolis, -- polygonal.

62. In Coronea, -- the same.

63. In Abai, -- the same.

In Lycosura, -- the same.

In Daphne, -- the same.

In Platai, -- the same.

In Oinoe, -- the same.

In Eleutherai, -- horizontal with inclined joints.

In Pharsala, -- the same.

In Messene, -- the same.

In Methana (Argolis), -- the same.

In Kleitor (Arcadia), -- the same.

On Samos, -- the same.

Etc. Etc.

44. Propylea.

When the walls enclosed large temple precincts, as in Olympia, Athens, Eleusis, etc., gateways without decoration were no longer employed, but magnificent portals-- propyleons-- with porticos and roofs decorated by pediments formed the entrance and indicated the facade of the temple, from the simple arrangement at Sunion to that most richly developed at Athens (Figs. 42, 48).

2). Retaining Walls.

45. Construction.

Remains of retaining walls have been preserved for us at Delphi and in the temple terrace of the Olympeion at Athens, originally commenced as a Doric building by the Pysastratides. Buttresses at regular distances interrupt the walls, which are battering on their inner sides, giving them great stability with a

moderate use of material. The coursing is uniformly horizontal at Athens, with a tolerably uniform height of the stones (1.84 to 2.23 ft.). Headers and stretchers alternate in the individual courses, although not regularly; 3 stones together make up a length of 18.70 ft. (equal to the distance between the buttresses), with a maximum of 19.69 ft. (Fig. 44). The stones are²¹² set without mortar, the headers extending into the wall up to 4.92 ft., and the breadth and height of the stretchers are usually equal. Their faces are in part brought to a perfectly true surface and are partly finished with marginal drafts and bosses. The inclined buttresses project from the wall as much as 3.28 ft.; individual stones of these bond into the masonry; others merely abut against it.

Near the principal cemetery of the Athenians in the vicinity of the Dipylon (now a cemetery near Agia Triada), there still stand magnificently constructed continuous retaining walls composed of extraordinarily fine and beautifully wrought ashlar, polygonal, trapezoidal, and those with reentrant angles. The jointing of this is finely executed in a masterly and finished manner; the faces of the stones are very slightly convex at their centres and are not perfectly smooth, this being caused by the 64. crisp and shelly fracture of the stone. The stones differ greatly in size, running from triangular spalls measuring but a few square inches up to blocks having 10.76 sq. ft. of face (Fig. 45).

The beds are horizontal throughout, though the courses interlock into each other. Headers and stretchers alternate quite irregularly in them, the former bonding into the wall up to 4.92 ft., the latter only 0.82 to 0.98 ft. The stones are in contact for but an inch or so in the joints, this being sometimes reduced to a mere edge, in a manner not to be recommended. The interstices between the stones at the back, like the external masonry, are filled dry with little fragments, large uncut blocks then abutting against them to make up the required thickness of the wall.

At the same place, we likewise find a stepped wall of Doric ashlar, whose bosses project an average of 1.57 ins., and which have very finely pointed drafted margins 2.36 ins. wide. In accordance with the arrangement of the bosses, these drafted margins extend around only three sides of an ashlar.

On a prepared horizontal footing course, we find finely executed polygonal masonry of breccia in the southern fortress wall of the Acropolis at Athens, and in the vicinity of this portion are also others, where the smallness of the pieces of blue limestone and of reddish breccia employed is striking. The smallest chips are again used, and economy of the material is carried to the extreme point. The stones bond 7.86 to 23.6 ins. (Fig. 35), and the beds are dressed smooth in the finest manner for a depth of 3.93 to 4.72 ins.

Such bits of walls are frequently only built to fill gaps in the naturally solid location of an area, as shown by examples on Samothrace⁴⁸: they are then not finished regularly at top, but the top is left irregularly jagged⁴⁹.

Note 48. See Gonze, Hauser, and Neumann. Archäologische Untersuchungen auf Samothrake. Vol. 1. p. 29. Vienna. 1875.

Note 49. Similar examples are found in the so-called pagan walls in southern Germany.

One peculiarity also appears in the walls of the Stoa of Hadrian in Athens, subdivided by buttresses, where the ashlar with drafted margins and bosses are set on edge and are unpleasant, as well as the sunken triangular bed joints.

In the retaining walls of the Altis in Olympia next the slopes of the hill, the porous yellow limestone blocks have an average size of 1.15 to 4.26 ft., were connected by double-dovetail wooden dowells (?), and their ends were joined by wooden pins. (The material of the dowells and pins has disappeared). The wall is subdivided by buttresses 2.07 ft. wide and projecting 4.27 ft., which are placed at distances of 19.70 ft.

An interesting combination of polygonal masonry and horizontal courses is shown by the retaining walls of the Theatre in Balbura (Lycian highlands), also furnished with buttresses. The walls are faced with polygonal, and the buttresses with rectangular blocks. Semper assumes the buttresses of the substructure to be merely ornamental, merely parastate, comparable to the ends of the timbers of Swiss houses, -- but they are too massively constructed for this, and where earth lies behind them, they have their actual structural purpose.

46. Stone-cutter's Marks and Setting Marks.

The ashlar, dressed on all sides, and which were completely

prepared by the stone-cutter, frequently bear marks on their upper surfaces, similar to those on the stones of mediaeval buildings. This custom extended over the entire ancient world.⁵⁰
 66 It is established everywhere, in Persepolis, Egypt, Jerusalem, Damascus, Baalbec, Sidon, on the Eryx, in Pergamon, on the Treasury of the Sicyonians in Olympia, on Samothrace, in Sicily and lower Italy, and elsewhere.

Note 50. See Richter. Über antike Steinmetzzeichen. 45. Programm for Winkelmann's Festival of Archaeological Society in Berlin. Berlin. 1885.

On blocks like the stones of the Cyclopean walls, which were prepared on the site just before setting, the marks are not found. They possessed no meaning for the building, but merely referred to the production of the dressed blocks, -- they were indications of origin, contractor's marks, but were not individual marks of the workmen. Fig. 46 represents such marks from Eleusis and Samothrace.

3). Foundations.

47. Foundations arranged in Layers extending through.

In some cases, it may be found that the entire rectangular area occupied by the plan of the temple was frequently covered by continuous courses of regularly cut limestone ashlar, bonded, but without mortar, even in case of a firm building site, which was found in case of most Grecian temples, built on the solid rock; the excavation for the building was not then made to accord with the plan, but the foundations were benched at different depths according to the natural position of the solid earth, so that in the Parthenon, for example, the northeast angle of the stylobate rests on the solid rock, while 9 foundation courses with an average depth of 1.64 ft. each may be counted on the southern side, and even 22 at the southwest angle, with 5 different foundation courses on the western side composed of various materials; on Poros ashlar 1.87 ft. high are placed 0.95 and 0.92 ft. courses of Poros stone and of marble. Courses of headers and stretchers alternate with those of headers and stretchers in the same course. In the lower courses, the faces are merely flat with imperfect joints; those of the upper courses have drafted margins with bosses or flat panels and a rather complicated arrange-

ment at the end joints for setting. (See Fig. 47: the bosses below the panels serve for receiving the iron crowbars or for hand holes in setting, and were to be cut off later). The foundation masonry projects only an inch or so beyond the steps of the stylobate on the west side, while on the south it is set back behind this about 4.92 ft. Otherwise the foundations correspond to the lines of the walls of the superstructure.

For the pronaos of the Temple at Phigaleia, the continuous layers of uniform masonry are abandoned; piers of ashlar masonry are constructed instead at certain points, the intervals between these being filled with rubble masonry (Fig. 48). (Emplekton of Vitruvius and Diamikton of Pliny).

Foundation masonry of unequal depth is also employed at the Heraion at Olympia, this also being on a varying site. The Temple partly rests on hard sand, partly on soft river sand. While the eastern portico has no foundation besides a sub--threshold, the foundations increase towards the east to a depth of 8.53 ft. with a width of 12.07 ft. The courses of ashlar in the foundations are not flush, but project irregularly beyond each other and widen downwards. For example, the course beneath the stylobate is narrower than it, while the next course is again wider. Both in this monument and in the Olympieion there, as well as on the Fountain-Sanctuary at Cadacchio, the foundation of the colonnade is separate from the foundation of the cella, the latter merely consisting of a few (1 or 2) courses of ashlar sunk in the ground in accordance with Egyptian customs, which did not employ foundations in courses.

In a temple constructed of noble materials, the masonry of the foundation does not usually consist of the same, but of a less expensive material (see the Parthenon and Theseion), while in those built of porous limestone, the same kind of stone is used in the substructure as in the superstructure. (See Temple of Zeus at Olympia, the Sicilian temples, etc). The foundation walls do not always rest on firm ground; they are not always placed on the rock; we likewise find them sunk in low, swampy places, as in Magnesia on Meander, on Samos, in Ephesus, -- in the latter place so that the building might not be affected by earthquakes, and that cracks in the earth might not be feared. (According to Pliny, Nat. Hist. 36 - 21).

Very carelessly constructed foundations of detritus and stone

spalls are shown by a Treasury in the Altis at Olympia (Fig. 49), and the projections at the locations of the columns in the interior of the Heraion there (Fig. 50). But this foundation in the latter plays a subordinate part, since thick slabs are laid over the mass of spalls and have a secure bearing on the continuous foundations of the internal columns and those of the wall of the cella. Descriptions of the foundations of this really oldest of Grecian temples with a mixed system of construction are given in the work on Olympia⁵¹, and Fig. 51 shows those of the Metroon in Olympia, by which the mode of execution is most clearly explained.

Note 51. Die Funde von Olympia. Edition in one volume, published by the Directory of the Excavations at Olympia. Berlin. 1881. pp. 32 - 35; Pls. 34, 36.

At the recently discovered Temple at Lokri, the lowest courses of stones rest on a layer of blue clay 3.94 ins. thick, which projects beyond the stones. The foundations of the different parts of the building are carried to different depths, and the layer of blue clay accordingly lies at various depths.⁵²

Note 52. See Mittheilungen des Kais. Deutsch. Inst. Röm. Abth. Vol. 5. Rome. 1890. pp. 177 - 201.

The foundations of Treasury VII in Olympia are placed on a heap of sand, and others are on brook pebbles.

48. Foundations of Circular Buildings.

Fixed starting points in regard to the foundations of circular buildings are given by Fig. 52 (Philiopeion in Olympia, Tholos in Epidauros) and by the Arsinoeion on Samothrace. The three outer circular ring-walls in Epidauros support the external colonnade, the wall of the cella, and the internal colonnade. A satisfactory explanation of the three inner ring-walls is still lacking.

49. Connection of Stones by Cramps.

In the foundation of the circular structure of the Arsinoeion on Samothrace, constructed of tertiary sandstone, the two lower courses show no holes for cramps; the succeeding ones have them, as well as the surrounding projecting marble border, while the course resting thereon exhibits none. The cramps themselves are wanting. On the sandstone foundation rose the marble structure.

At a treasury in Olympia, the stones are held together by

double dovetail cramps, just as this was observed and cited on the wall of the Altis at the base of the hill Kronion. ⁵³

Note 53. Double dovetail cramps are also shown by the foundation stones of the Sanctuary of Athena Polias in Pergamon. Each stone is connected with its neighbor lengthwise by two double dovetails, sidewise by only one.

50. Foundations in Messa.

At the Temple of Zeus there (Olympia), the cella walls rest on bonded slabs of stone, which are held together by iron I-cramps set in cast lead. The pavements of the external and internal colonnades have through-coursed stones, which receive the pebble plastering and the coating of cement.

The foundation of the statue of the deity is treated in a peculiar way. Grooves were cut in the Poros stones and pieces of compact white limestone were inserted in these grooves, on which were laid the joints of the thick bluish pavement slabs (Fig. 53), which rest on drafts and were connected together by I-cramps. The mode of jointing and fitting the marble floor around the internal columns is likewise interesting (Fig. 54).

At the Temple in Messa on Lesbos, the foundations consist of the four enclosing, two longitudinal, and two cross walls, which together form a network of 9 rectangles. The two middle rectangles on the ends are filled by a complete foundation of the same kind, which probably does not extend as deeply as those of the principal walls. In the six external rectangles along the sides, a similar continuous foundation begins with the course of the lowest step, so that the courses of the steps of the temple, the crepis, form a compact whole, with the exception of the interior of the cella. The spaces within the rectangles formed by the foundation walls are carefully filled with spalls of the same material, which consists of black trachyte-tufa.

51. Egyptian Foundation Walls.

The foundation walls of Egyptian structures were made but little wider than the corresponding principal walls and usually rest on the solid rock, both arrangements being retained by the Greeks also, as already shown; excepting that one peculiarity has not yet been found on Grecian soil; the sunken or curved arrangement of the beds, somewhat like our inverted arch-

es, which is regularly repeated at certain distances along the entire façade, and is characteristic of many Egyptian buildings. Viollet-le-Duc regards this slight curvature of the courses as a precaution against the injurious effects of earthquakes upon the structure.

4). Stylobate.

52. Construction of the Steps.

Above the foundation masonry, and with the finest jointing and coursing of the ashlar, rises the stylobate (Plinthus), a stepped construction divided in several parts, which separates the house of the deity from the earth on which it stands, and represents a monumental offering to the deity himself. It serves as a pedestal for the columns and the cella and makes preparation for the building proper. The steps extend around the columnar structure, the different rows projecting uniformly and being usually carried around in like form, sometimes with plain rectangular forms of section, sometimes more richly treated by recessing the front surface, the tread surface being almost always imperceptibly inclined outwards for carrying off the rain water. The stylobate is frequently massive in the older temples in proportion to the height of the columns (compare the Sicilian temples with the Athenian); in the best period, it occurred in a carefully determined proportion to the entire superstructure; 5 or 6 steps, frequently of unequal height (see Selinus and Akragas, also Fig. 55) generally lead up to the sanctuary in Sicilian temples, with only 3 or 4 in Athenian, or even but 2 in the Theseion, the last number being also shown by the ancient Heraion at Olympia.

In case of high steps with a rise of 1.18 to 1.97 ft., since they cannot be considered as being carried around as steps for ascent, in order to make it possible to ascend the substructure, special steps for use are also usually cut out or inserted at the eastern end, either extending across the entire front, over 54 3 intercolumniations only, or over but one; in some cases, ramps of slight inclination lead upwards instead of steps. At the Heraion in Olympia, only a single narrow stairway led to the cella between the angle column and the one nearest it on the longer side. The uppermost step usually serves as a base for the columns and has a breadth somewhat greater than the diameter of the col-

umn, that it supports; the columns then stand on single blocks (Theseion, Propyleion) or on two abutting beneath the centre of the column (Parthenon), or on long slabs, as between the antae of the opisthodomus of the Theseion, where the joints do not coincide with the centres of the columns.

Note 54. Temple of Asclepios in Epidaurus; on the Temple of Zeus in Olympia is a peculiar combination of steps at the sides and a ramp on the front end; on the Artemision in Syracuse before the middle intercolumniation of the front is a flight of 12 low steps of stone 10.95 ft. long.

53. The steps at the Parthenon and Theseion only overlap each other a few inches, 1.18, 4.33 and 5.91 ins., while at Phigaleia (Fig. 56), they overlap nearly as much as their projection; at the Great Temple at Akragas, they are deeply bonded and notched into the masonry of the stylobate, a careful, solid, and complicated mode of construction. They are divided into loaded blocks and those free from all pressure, which are merely inserted. The latter were only set after the building was complete and the scaffolding removed (see ruins of Egesta), to avoid injuries and additional work afterwards. Inserted steps (step blocks) would in time and in all buildings become different in height from the adjacent loaded blocks. To this mode of setting the stone and to the slight bonding of the courses together is indeed due the deformation of the substructures of many Grecian temples. On the explosion of powder in the Parthenon, the loaded blocks remained in great part upright and in line, while the inserted ones were all forced from their original positions, frequently 5 inches or more from the original line.

53. Execution.

At the ~~edge~~ surfaces, the stones only touch each other on the margins over a marginal joint 2.36 to 3.15 inches wide, while the central portion is cut back (see Fig. 56, Theseion, Parthenon, and Temple of Poseidon in Paestum); only thus was it possible to produce the magnificent joints exhibited by the ashlar masonry of Grecian monuments. The dressed blocks were not artificially fixed or otherwise connected together. The Propyleion in Athens and the Temple of Poseidon in Paestum, neither of which was entirely completed, show the surfaces of the inserted and the bonded steps but partially worked; Drafts 1.97 and 2.76 ins. wide

outline the completed form, while the upper portion projects 1.18 to 1.57 ins. beyond them and is only pointed. On these imperfectly worked surfaces, the columns of the Propyleion at Athens are set by sinking a circle or square area to the true level, and this is very carefully rubbed down; in order that the rain water may not stand therein, small channels are incised and extend to the outer edge. The last dressing of the remaining portion of the stylobate was left until a later time.

The never completed Temple in Eggesta exhibits similar contrivances for protecting the angles and surfaces from falling scaffold timbers, tools, or dropping stone spalls, which must have been produced in finishing the columns and the surfaces of the walls. To make the setting of the drums of the columns possible, the supporting blocks beneath the columns here received on the roughed upper surface a circular sinking, carefully worked true, which had a diameter about 3.54 ins. greater than that of the column, and a depth of about 1.18 ins. The drums were set in these sinkings, after a margin 2.55 ins. wide had been cut on them with the required diameter of the column; .97 in. was afterwards dressed off the external surface of the drums (Fig. 57) and .97 to 1.18 or 1.57 ins. from the surface of the stylobate.

The columns and walls usually rise directly from the stepped substructure; an exception is made by only one example, the in many respects enigmatical Sancturay of Zeus in Akragas, where a special moulded base is set on the stylobate, serves as a base for the walls, and is carried around the half columns (Fig. 55).

5). Floors.

54. Floors of Stone Slabs.

The floors of the porticoes mostly consist of tolerably large and thick slabs of limestone or marble of square or rectangular form, from 10.78 to 16.15 sq. ft. in area and 0.67 to 0.79 ft. thick, which are carefully jointed together and rest upon separate stone piers (Phigaleia) or on the extended courses of the stylobate masonry. They are laid with some fall from the cella wall to the edge of the stylobate, about 0.459 in. for a width of 13.96 ft. at the Parthenon.

In the same plain manner is also floored the interior of the cella, the pronaos, and the posticum (Compare Parthenon, Phiga-

leia, and Selinus).

The floor of the Temple of Poseidon at Paestum is executed in a peculiar way; raised courses of ashlar 5.25 ft. wide serve as supports for the inner columns; adjoining these are slabs of limestone 1.54 ft. thick and 7.68 ft. wide, their upper surfaces sunken next the wall and forming the floors of the side aisles; 3 rows of slabs are laid in the centre aisle, the middle one being horizontal and sunk to the level of the floors of the side aisles, and the adjacent ones being laid inclined to it (Fig. 58).

55. Mosaic Pavements.

The Temple of Zeus at Olympia forms an exception in the floor of its pronaos; the simple pavement of slabs is abandoned and gives way to the magnificent mosaic, made of pebbles from the Alpheios (Tritons surrounded by palm ornaments, the individual panels being bordered and separated by fret patterns), discovered and published by Abel Blouet. According to Pausanias, the portion of the floor immediately before the statue of the deity was not laid with marble, but with black ashlar; a raised border of Parian marble surrounded the black panel in a circle, so as to prevent the oil from flowing away.

Olive oil was here poured upon the ivory, so that it might not be injured by the marshy location of the Altis; water was used instead of oil for the chryselephantine statue in the Parthenon; the statue in the Temple of Epidauros stood over a fountain, so as to make this saturation unnecessary; the last statement of Pausanias was not corroborated by the excavations.

The floor of the portico was composed of small river pebbles set on edge in mortar, then covered by a coating of smooth stucco mortar, while the side aisles in the interior had a coating 1.57 ins. thick on a basis of stone slabs. The remains of a marble facing in different colors at the entrance side belongs to the Roman period.

Plastered and colored pavements are also found in smaller temples in other places, as for example, floors of red stucco on a bed of limestone slabs at Egina; the plastered Sicilian temples must have had similar floors of colored stucco.

6). Walls of the Cella.

56. Form.

Walls enclose the sacred apartment, where statues of the deity and gifts were placed, secluding these from profane eyes and affording to art works protection from the weather and from theft. A consecrated internal apartment was surrounded by them, richly ornamented architecturally and decoratively, and it was enclosed above by a protecting ceiling. In accordance with its developed purpose, this was externally treated plainly and without ornament, either constructed of limestone ashlar with a coating of stucco, or of marble ashlar with the most careful jointing, the joints almost invisible, and internally decorated by paintings.⁵⁵

Note 55. As stated in the Introduction, unburnt bricks were also employed instead of monumental ashlar masonry in the oldest temples, as well as later on account of lack of means, probably in the manner described for the walls in Troy. The Heraion in Olympia should be included here.

Being vertical and "subject to the general law of proportional development", the walls consist of a broad base projecting beyond the foundation, of the wall proper, and of a crowning cornice, or slightly projecting terminal member on which rest the ceiling beams. The proportion of thickness to height in most cases varies from 1 to 9 to 1 to 10, or 1 to 10.5, while the height goes 2 to 2.5 times into the free length, or ^{1 1/2} the longest free portion between transverse walls; hence there results from this always a great, or at least an average, stability of the walls.⁵⁶

Note 56. See Rondelet. Traite theoretique et pratique de l'art de batir. Paris. 1856. pp. 2 to 17.

56. If in the masonry of retaining walls, the strength and character of the masonry are made prominent by the coursing, batter, buttresses, and the rough visible faces of the individual ash-lars, these ideas decidedly recede into the background in the aspiring walls of the cella, free on both sides. The walls are battering inside as well as outside, though not in all cases and in a perceptible manner; Egyptian tradition required a considerable batter on the exterior of the walls of the structure, but it scarcely occurs here. The same feeling that desired the columns to be diminished upwards, must have likewise prescribed a corresponding diminution in the thickness of the walls. The

most apparent reason for the construction of walls increasing in thickness downwards was indeed in Egypt, as everywhere, the greater durability, solidity, and stability of masonry arranged in that manner. The particular motive of the primitive dykes of the Nile was not required for this, as frequently assumed; mankind usually soon observed that a body stands the more firmly, the broader its base. The probability of its better preservation was indeed the cause of the careful dressing of the external surface, exposed to the wind and the weather.

57. Construction.

The base of the wall generally consists of one or two low plinths projecting beyond each other (.98 to 1.48 ft. high), or sometimes more, sometimes fewer (Parthenon 2, Egina 2, Phigaleia 1), the lower one of these usually having the least height (as likewise frequently occurs on the stylobate), or of a richly moulded base with plinth, cyma and band, as on the Theseion, >> these members then being returned around the ends of the wall, for which they become formal pier bases. Above this extends a double band course 2.62 to 4.66 ft. high in the various monuments, and which projects .31 to .39 in. from the true face of the wall. These ~~two~~ bands are sometimes of equal, sometimes of unequal height (compare Phigaleia, Paestum, etc., Figs. 59, 60), and do not touch each other in the centre of the wall, and only along a border on the end joint, worked to fit as closely as possible. The proportion of height to length in these is $1 \frac{1}{2}$ to 1 : 2.6 (Parthenon, Theseion). A moulded base and projecting band course form the accented base in all cella walls (see Temple S at Selinus, Paestum, Egina, Olympia, Parthenon, Phigaleia, Theseion, Propyleion, etc.: Sicilian temples more commonly employ uniform courses throughout): above this commences the uniform coursing, the Isodomon of Vitruvius, of ashlar masonry bonded with extreme care. The courses are of uniform height up to the cornice and exhibit on the external surface a ratio of $1 \frac{1}{2}$ to 2.4 of height to length. Headers and stretchers, the latter not touching each other in the middle of the wall, alternate in the courses; mortar is not used, but a sufficient connection is obtained by means of pieces of iron set in lead. Small iron dowells connect the stones vertically and thus prevent the removal of one stone from above another, and iron I-shaped

cramps connect them lengthwise (Fig. 61); they again merely touch each other on a surface 2.36 to 3.14 ins. wide on beds and end joints. Not only marble ashlar, but even the common limestone ashlar (see Egina) were dressed and connected together in the same careful manner. Behind the dowells are usually found small holes, the so-called "bar-holes", cut in the upper bed, in which the crow-bar is inserted to slide the ashlar together. (Compare Parthenon, Heraion at Olympia, and the Mitt. d. Kais. Deutsch. Archaeol. Inst. Athens. Abth. 1881. Pl. 12). Bronze was never used as a common material for cramps here; belief in its presence has unfortunately aroused the avarice of mankind in but too many cases and has contributed to the destruction of many monuments. Even on Attic soil may be seen the criminal traces, the cutting away of columns and ashlar at bed and end joints, scarcely any monument being free from these trial holes!

On the Heraion, and also in part on the Temple of Zeus in Olympia, the base slabs of the wall are arranged on the exterior alone, while the courses in the interior are constructed with low ashlar. The ashlar then have, for example on the Heraion, a thickness of 1.22 ft. and a length of 7.38 ft. with a height of 3.41 ft., which corresponds to four courses of ashlar 2.63 ft. thick. On the Opisthodom (northwest angle) of the Temple of Zeus, the side walls are composed of two courses of slabs connected by iron I-cramps set in cast lead and together 4.4 ft. thick with a height of 5.73 ft. The slabs in the cella wall are 8.38 ft. long, 2.2 ft. thick, and 5.73 ft. high, corresponding to courses of ashlar 2.46 ft. thick and 1.97 ft. high. While in the Temple of Zeus, the ashlar are indirectly connected by iron cramps, which also occurs on the Metroon, and indeed already in the masonry of the substructure, the dressed ashlar of the Heraion are joined without any connecting material, and the blocks do not touch in borders but in sharp angles, produced by undercutting the end joints of the ashlar. (Cut, p. 79). This kind of jointing and dressing is the older.

Also without the use of iron cramps, a temple wall 2.1 ft. thick was⁵⁷ moreover constructed during the Hellenistic period in Sillyon, being indeed built of limestone ashlar with smoothly dressed faces, where a course of headers alternates with two

courses of stretchers in height.

Note 57. See Hiemann & Petersen. Städte Pamphyliens und Pisidiens. Vienna. 1890. Vol. I. p. 77.

At the Ptolemaion on Samothrace, courses of headers and stretchers alternate in height and show a connection by iron cramps, similar to that of the Attic monuments, excepting that U-cramps⁵⁸ are employed instead of I-cramps.

Note 58. See Gonze, Hauser, & Benndorf. Neue Archäologische Untersuchungen auf Samothrake. Vol. 2. p. 39. Vienna. 1880.

The exclusive use of iron for bonding walls at the Theseion, the little Temple of Nike, the Olympeion and the Parthenon, in Athens, at the Temple of Zeus and the Metroon in Olympia, the Temples on Egina, in Sardis and Ephesus, the Temple of Poseidon in Paestum, the Temples in Selinus, the Propyleions in Athens and Eleusis, Hadrian's Gate and the Market Gate in Athens, etc., has already been pointed out, and we shall return to this in the succeeding volume of this Handbook (p. 133); the use of wooden double dovetails has likewise been already mentioned.

Besides the U-shaped cramps, bent at a right angle at both ends, these projections then being set vertical or horizontal, and I-shaped cramps, as well as square pins and dowells, N-shaped and Z-shaped cramps are found, though rarely. Besides iron cramps, Hauser found on Samothrace bronze joggles in cast lead⁸⁰ and also lead cases⁸¹ from 2.75 to 3.15 ins. high, 1.57 ins. wide and .59 in. thick.⁵⁹ Small bronze cramps of N-shape also occurred in Sicily; in Epidauros are bronze joggles of the size and shape represented in Fig. 62; the metallic double dovetails with pins and set in lead on Lesbos and Samothrace are worthy of mention.

Note 59. Same Work. pp. 70, 71.

Lead double dovetails and iron dowells in lead cases and also lead I-cramps exist in architectural fragments of Poros stone on the Acropolis of Athens (Fig. 62).

Lead was by preference employed for patching and for fixing small ornaments of stone (for example, drops on the mutules), as repeatedly shoun by examples in Athens, Olympia, and other places (Fig. 62).

The iron I-cramps in Olympia have a length of 9.43 to 23.6 ins, according to the dimensions of the blocks of stone to be cramped together, with a cross section up to .98 in high and

.59 in. thick. Small round bronze pins for fixing added pieces may also be seen in some marble cornices in the Acropolis Museum at Athens.

The cornice member, which crowns and finishes the cella wall at top, usually consists of a rather low band projecting but slightly from the face of the wall, and which is decorated by a fret pattern and terminated above by an ogee cyma. When the originally solid end wall was changed into antae or a complete colonnade, another mode of treating this portion was introduced, the form of the cornice of the portico or an allied form being transferred to it, the simpler cornice being used for the former partition wall, which was then the wall containing the doorway. The architrave fillet could then be introduced for a richer effect, cutting off a plain frieze with the band, as in the Opisthodomus of the Parthenon.

The dressing of the external surfaces of the ashlar was only done after they were set in the building itself. The internal and external walls of the portico for the guard, as well as a part of the gateway walls of the Propyleion in Athens, are still in their rough condition; drafts 7.87 ins. wide are carried around them above, below, and on their sides, and indicate the plane down to which the surfaces were to be worked; the ¹⁰²ashlars of the external wall still frequently retain the bosses for setting, or rather guide-marks for the work, frustums of quadrangular pyramids, whose sides are from 5.9 to 7.87 ins. square at the base, and their projection is 3.94 ins. or more. The most interesting example in this respect continues to be the never completed Temple in Egesta.

58. Setting the Ashlars.

A peculiar device for raising and setting is shown by the ashlar of the cella walls and the floor slabs of the Heraion in Olympia, where as in Fig. 63, they are perforated and are furnished with bar-holes on their upper surfaces. The same arrangement likewise appears on the oldest architectural remains on the Acropolis of Athens, which are built into the northern wall. One of the Poros capitlas there (northeast angle) has on the abacus the device in the dimensions given in Fig. 63.⁶⁰ At the Heraion we likewise find holes in the steps of the stylobate, extending from the bed to the tread surface; it is as-



sumed that these served for fastening the sacrificial animals.
 22. Similar holes are also found in the angles of the casemate piers in the fortress of Euryalos in Syracuse, which certainly served for securing horses.

Through holes were indeed the most ancient means of setting dressed stones; after these probably came the U-shaped grooves, and only then the lewis (Fig. 63).

Note 60. Hittorf already noticed these arrangements, Taf. 89, n. 309 et seq., and mentions a capital from the interior of the Temple on Egina.

7). Doors and Windows.

59. Doors.

As already stated, the doorways first afford access to the cella; their architraves surround an opening of rectangular or trapezoidal form; in the last case, the jambs are not vertical, but are inclined inward, the clear width then being diminished upwards (Fig. 64).

A complete doorway to the cella is not preserved in a single Doric temple; we can only decide on their original treatment by means of fragmentary remains. The jambs of the doorways were frequently formed by the ashlar courses of the walls of the cella extending through to the opening, as already shown at the Treasury of Atreus, or was formed by separately set plain jambs, which were interrupted and bonded with the masonry of the wall by headers or by horizontal lintels (compare Parthenon and Propyleion in Athens), while the top was always composed of a massive horizontal lintel.

Cavities in the jambs of the doorways of the Propyleion, as well as holes and pins in the lintels, permit the assumption of a separate rich casing executed in marble or bronze and attached to them.⁶¹ The doorway of a tomb in the Doric order at Antiphellos, among other examples, gives points on the treatment of the architrave of the doorway (Fig. 64). Recessed in several planes and with a richly sculptured profile, this surrounds the opening; ears on the lintel give to the whole a greater relief and expression; a crowning cap is decorated by anthemion ornaments and forms a further decoration.

Note 61. For bronze coverings, see Normand, Role du Metal dans la Construction Antique. Enc. de l'Arch. 1888. p. 61 - 81; pls.

878 - 895, with the examples from the Museum at Avenches (*Aventicum*) there represented.

The considerable dimensions of the clear opening of the doorway in proportion to the apartment to which it affords access, were already pointed out; consequently, besides facilitating passage, it must have had a further purpose of admitting light to the interior.⁶²

Note 62. At the present time, we actually light gateways, corridors and vestibules through the principal entrance doors or gates.

Comparing this proportion for several important monuments, the following results are obtained.

Buildings.	Clear Area of Door.	Floor Area of Interior.	Ratio of Areas of Door and Floor.
Parthenon. Mid.aisle.	667.17 sq.ft.	2722.2 sq.ft.	1 to 4.
Parthenon. Opisthodomē	462.84	2766.3	1 to 6.
Temple on Egina. M. Aisl.	125.94	449.95	1 to 3.5.
Temple in Phigaleia."	161.46	522.02	1 to 3.2.
Temple B in Selinus.	365.97	3035.3	1 to 8.
Theseion.	97.94	726.55	1 to 7.4

It should not be forgotten that the openings of the doorways extend almost to the ceilings of the apartments.

The outermost side doorways of the Propyleion in Athens were actually intended for ordinary access to the Acropolis and now have clear openings measuring about 52.74 sq. ft. each, which is to be reduced to 48.44 sq. ft. (4.6 × 10.5 ft.) on account of the removal of the casings, which are wanting. If these proportions were satisfactory for the gateway to the Acropolis, they would be sufficient for entrances to interiors, which occupied but a moderate portion of the area of the plateau of the Acropolis, if they were required to serve for a similar purpose. But this was no longer the case, as soon as they were required to fulfil the two-fold purpose of affording access and of admitting light. For these reasons, we also find the doors of temples to be of large dimensions; through the opened folding doors, which were turned toward the rising sun, an abundance of light streamed into the cella, sufficient for seeing the statue of the deity and the gifts with the desired distinctness.

The elongated cellas of Sicilian temples were most poorly lighted; but if we take into consideration the alleged more favorable conditions of light in the South, even these interiors could always have had a sufficient degree of illumination at certain hours of the day, in spite of the circumstance that the light was further weakened in passing to the doorway behind the columns placed in front of it. We can go to the limit of 1 / 10 in case of our rooms, which require less light, and the same might be permitted to the detached southern temples, mostly quite elevated and not deprived of light by neighboring buildings or narrow streets; yet men never went so far.

84. But the lighting of an Art Gallery in the modern sense was also never required for interiors consecrated to the deity; as may be found everywhere in the South today in ecclesiastical buildings, a musty lighting of the interior, whose effect could be heightened by the light of lamps and of the sacrificial fire, was preferred to the dazzling light of day; after entering the sanctuary, one should feel himself separated from the external world.

The entire light, that might stream through the doorway, was not usually found necessary in the interior; the closed folding leaves of the doors were usually of metal and were perforated in their upper parts, admitting sufficient light (the doorway of the Pantheon at Rome, although considerably later, affords the best conclusions in regard to the conjectural treatment of the door of an antique temple), and the temple doors were only opened for their entire width during the ceremonial, when a full view of the statue of the deity must be permitted to the person offering a sacrifice. (More on this subject under Arrangement of Temples).

If the peripteral temple received sufficient light through the opened doors, this was much more the case in the so-called antae-temples. Unbroken and not hindered by colonnades, the bright morning light could penetrate therein; it required no additions through concealed or petty holes in the frieze or in the shadow of the cornice, or through the metopes.

60. Windows.

For this reason, windows never occur in the walls of the cella of any species of temple belonging to the Doric order; in the

colossal and enigmatical structure of Zeus Olympios at Akragas, windows are indeed described between the columns of this pseudo-peripteral temple in the previously mentioned works of Cockerell, Kinnard, Donaldson, and Jenkins and Railton; from the condition of the ruins, the earlier statements can now longer be made clear.

On the left side of the Propyleion at Athens, in the building that contained the paintings and behind a row of columns, there stands a wall, which is perforated by a door and two windows. We can at least see by this how the window was treated in secular Doric structures. The sills of these windows extend through from the side walls to the doorway as a plain rectangular sill course of Eleusinian marble of bluish-black color, projecting but slightly from the face of the wall; the jambs are treated in the style of antae as narrow projecting bands without bases, but have the complete capital of the large antae; a higher course of ashlar also extends clear across and forms the lintel, though it is not otherwise distinguished.

8). Columns.

61. General Treatment.

Free-standing supports intended to receive the burden of the entablature laid upon them should make their supporting strength manifest, and they then awaken in the observer a feeling, as if they rise up against their load with an organic movement, and resist its opposing pressure. This upward striving must necessarily result in an enlargement where it meets the loading. The same will occur where the free column comes in contact with the ground, and in this way naturally arises its three-fold division into Base, Shaft, and Capital.

In the Doric column, the base vanishes into the uppermost step of the stylobate; a shaft of circular section thus appears without a base and diminishes upwards, with a simply appearing capital, which has a strong projection in ancient monuments. The structural idea controls the form of this column; the shaft is diminished in accordance with statical laws, and the measurements of diameter and height do not vary much in reference to each other (their ratio lying between the limits of 1 to 4 and 1 to 6.5); for the same reason, the pressure of the entablature and the weight of the ceiling are distributed over a larger sect-

ional area of the support, and a more convenient resting place for the architrave is made possible; for reasons of stability, it ends in an enlargement increasing upwards in an ogee curve, and which is covered by a square slab, forming the transition from the circular column to the rectangular architrave. The change from the round shaft to the rectangular architrave cannot be conceived more simply and naturally than it occurs in the Doric column; it appears so self-evident, that it is unnecessary to consider this development as being in accordance with a weak analogy pertaining to the plant kingdom.

The massive shaft is decorated by vertical flutes or channels, which by their stiffness bring out still more clearly the upward growth of the shaft and its capacity of resistance. The circular form of the free column occurs as known from the first; we do not need to consider that the Greeks first made the obvious change, which the stone-cutter must generally employ in producing a cylindrical form. The stone is broken out in the quarry in prismatic form and is then wrought octagonal, sixteen-sided, and finally circular. In view of the octagonal shafts of columns found at Trozene and at Bolimnos, to conclude that a successive development of circular free columns occurred in this way, would be to abandon all possibility of any spontaneous suggestion or comprehension of an artistic idea. No art forms were ever invented by means of the conditions of manual execution. The square pillar occurs at the same time as the octagonal and circular forms, and it is also possible that the known remains of such columns were only intended as preparatory for a later circular form. The model for the cylindrical free column was so near to mankind in the trees of the forest, that no transitional form was required; but the Greeks certainly no longer needed to make any experiments in this way in the year 1000 B. C., after the perfected stone column had already been employed 1200 years earlier in Egypt, and the sensitiveness of the two countries towards each other in the earliest period has been shown.

The first stone columns with diminished and fluted shafts rising from a flat and disk-like base and crowned by a square abacus, on which is laid the rectangular architrave, both portions being indeed cut from one block of stone, are found in the Grotto-Tombs of Beni-Hassan, of the era of the 12 th dynasty (2200

B. C.), and again later in the buildings of the 19 th dynasty. (1392 B.C.). These pillars bear the name of "Protodoric" and may have served the Greeks as models; to have created from these poor materials the perfected form of the Doric column is the incontestable merit of Grecian genius.

62. Entasis.

The shaft of the column does not always diminish in a straight line; a slight outward curvature of this (Entasis) gives the column more animation and recalls the lofty trunk of the Egyptian date-palm, slightly swelled at its mid-height and only bearing leaves at its top. On the older monuments, the character of the column is stumpy, even to heaviness, and the diminution and entasis are frequently so great, that the shaft receives a sack-like appearance; (compare the Temple of Demeter and the Basilica in Paestum); the shaft is often diminished without the elastic curvature, appearing sluggish and lifeless, as on the Temple in Corinth. (Fig. 65).

63. Diaemter.

Vitruvius requires the diameter of the column to go 6 times into its height, exclusive of the capital, so that the "Doric column may exhibit in buildings the proportions and the sturdy beauty of the masculine body". Neither in the early nor in the best period is this proportion of 1 to 6 retained in Grecian works. (It varies from 1 to 4 to somewhat more than 1 to 5.5, but it was exceeded in buildings of the late period, as in Nemea, 1 to 6.5). The columns of Corinth and Nemea may be regarded as being in their proportions the minima and maxima of the Doric order (Fig. 66).

64. Flutes.

The concave flutes (Rhabdosis) animate the shaft and commence directly on the uppermost step of the stylobate⁶⁵, usually terminating in a curved form beneath the echinus. The channels have a flat elliptical, oval, or segmental form, according to the material of which the columns are constructed, and intersect each other in a sharp edge, equally delicate in stuccoed and marble monuments; only on one temple in Selinus (S) are narrow fillets left between the flutes on a few columns. Vitruvius requires for their form the simple circular arc, described from the centre of a square constructed on the width of the flute as a base, and touching the angles of the square; the line obtained in this way

agrees in the fewest cases with those preserved on Grecian monuments. (On a Poros fragment on the Acropolis in Athens, the flutes are spirally arranged).

Note 63. An exception is made by an angle column of the so-called Artemesion in Syracuse with an inscription referring to Apollo on the uppermost step of the stylobate, where the flutes first begin above a plain base-band 11 ins. high, by a column of the Heraion in Olympia, and by a Grecian temple in Pompeii. Also see *Die Stadt Syrakus im Alterthum*. Authorized German edition of Cavallari-Holm's *Topografica Archaeologica di Siracusa* by E. Lupus. Strasburg. 1887. pp. 80 and 288.

Sixteen to twenty (twenty-four extremely seldom) such flutes surround the surface of the column. the first number occurs on a few ancient monuments, and also on such as belong to the late period (for example, the Temple in Sunion); the last number is that common on Doric monuments of all ears. The Heraion in Olympia, with its columns having 20 flutes, exhibits one with 16. As shown by the columns in Sunion, the smaller number of flutes is no evidence of a greater age of the monument. Flutes are found in some buildings, interrupted by one or more incisions before they terminate, i. e., a separate necking (hypotrachelion) is cut off by them but a little below the capital. These incisions never resulted from technical causes, for otherwise, similar original conditions must have everywhere produced similar practices, and these would be everywhere found. But no incisions at all and consequently no separate necking of the column are found on the oldest sanctuaries in Assos, Cadacchio, Metapont, the Temple of Demeter and the Basilica at Paestum, Temple S in Selinus, the Artemesion at Syracuse, the Temples of Concord and of Zeus at Akragas and Olympia; only a single one is found on the great Temple of Zeus and Temples D and R in Selinus, the Fountain-Sanctuary in Cadacchio, the Temple of Hercules in Akragas, the Theseion, Parthenon and Propyleion in Athens; but two on Temple A in Selinus; three in Corinth, on the Temple of Poseidon in Paestum, and on the Temples of Athene in Syracuse, on Egina and in Phigaleia, with even four on a Poros capital on the Acropolis in Athens (Fig. 67).

On a second fragment of a column with spirally arranged flutes at the last place, the recurved form at the necking is also

preserved, and it has the same shape as in case of vertical flutes.

88, 65. Capital.

Before the broad expansion of the echinus is developed, and especially in Sicilian and Italian monuments (one example also in Tiryns), there occurs a cove, into which the flutes either intersect or terminate (compare Selinus), or this is ornamented by a fully sculptured circle of leaves, finishing next the flutes with an astragal, beneath which the flutes end abruptly, only in approximately semicircular form or with corners slightly rounded (compare Temple of Demeter and Basilica at Paestum). Two such margined recurved leaves occupy the width of one flute. Some columns of the Basilica have the ends of the flutes bordered and enclosed by a small astragal, causing the lower roll-like margin of the leaves to project even more strongly in the form of an astragal. Above the series of leaves is another half-round moulding on the echinus, that according to some columns must be considered a beaded astragal. Others show above the circle of leaves an ascending anthemion ornament or interwoven bands (Fig. 68). This richly sculptured treatment of this part of the capital disappears in the best period and gives place to several annular rings (Annulets), which follow the outline of the echinus and project from it but slightly. The line of the end of the flute coincides with the lower edge of the lowest annulet; this is then made wider than the others. Three, four, or five such rings occur above each other or are grouped together; but we also find annulets above the plain concave moulding of ancient Sicilian columns (compare Selinus). The annulets have but a slight projection and width on the marble structures at Athens, and can only be directly executed in that material, or only in the stucco coating over coarse limestone. On the Temple of Poseidon in Paestum, we meet with a still further development of the terminations of the flutes. The edges are carried to the edge of the lower annulet and stop there quite abruptly; the form of the echinus then passes cup-like into the cylindrical form of the shaft, and the surfaces of the flutes intersect the cup-like surface in sharply drawn curves.

On the monuments of the older style, the echinus is a strongly

projecting, flattened or convex, often weakly relaxed line, which becomes in works of the best period a tensely ascending and slightly projecting nearly straight line with a quick inward curvature at the abacus; on those of the later era (as in Sunion, Nemea, and the Market Gate in Athens), the echinus shrinks to a delicate and refined, though somewhat effeminately appearing member; it is then bordered beneath by half-rounds instead of annulets. (Compare the capitals found in the excavations between the Theatre of Dionysos and the Odeion in Athens). A tangent drawn to the curve of the echinus at its lowest point often scarcely makes an angle of 30° with a horizontal in ancient structures, while in those of the best period, this increases to one of 55° .

A square covering slab, the Abacus, sometimes exceeding the echinus in height and sometimes inferior to it, projects very little or not at all beyond the greatest projection of the echinus and forms the termination of the capital; this has to make the transition from the circular to the rectangular form, to receive the horizontally supported structural members of the entablature and to afford them a firm resting place. The echinus and abacus remain in all periods without sculptured ornamentation; small bordering mouldings or crowning mouldings first occur on the abacus in the later period (compare Capitals from Athens)' sculptured decorations of the echinus are unique and are only to be found on the small Doric-like capitals above the head-cushions of the caryatids of the Ionic Eretheion, if these may or should be in a general way included among Doric capitals.

66. Decoration in Relief and Color.

Though sculptured ornament was excluded from these portions, decorations painted in colors and harmonizing with the ornamentation of other members were the more abundantly employed. Vestiges of painted ornamentation on the echinus and abacus of a Doric capital are no longer to be traced in any building, but its form may be learned from fragments of allied members and from paintings on vases. The echinus of the Ionic and caryatid capitals exhibits ovate leaves, partly sculptured and partly painted; the fret pattern occurs frequently enough on band-like members, so that both forms of ornament may be assigned to the members in question. Instead of the ovate leaves pointing down-

wards (egg-and-dart moulding), the anthemion ornament is found in paintings on vases aspiring upwards, so that an upward or downward pointing ornamentation symbolizes opposition, a crowning, or compression.

10 Semper recognizes in the oval leaves nothing more than a series of conventional unities, by which Above and Below are indicated in the form, while Bötticher everywhere holds them to be recurved leaves, half covering themselves up.

On the strongly projecting capitals of Selinus and Paestum, the decoration of the echinus by recurved ovate leaves appears disproportionately coarse in comparison to the other ornamentation, even seeming monstrous.

The employment of decorative elements of opposite direction on the same architectural member may not be surprising, in so far as one is justified in regarding this form as compressed and as opposing this pressure. The anthemion and egg-and-dart ornaments also occur everywhere as decorations of the cymas of the pediment-cornice (compare Parthenon and Propyleion in Athens), and on the same members are again found the upward aspiring and the descending ornaments.

On the Francois vase, two forms of Doric capitals occur on the Doric buildings painted thereon, one having a disk-like projecting echinus capital with rectangular abacus, the other with a pear-shaped transitional member and a moderate projection. (Fig. 69). Similar forms are found on other vase paintings of the earlier period.

The pear-shaped capitals have preferably been assumed to be inventions or fancies of the painter; but the evidence for them 157 in stone has been found in the steles or the supports for consecrated gifts, which were discovered in the so-called Persian rubbish on the Acropolis of Athens, and which are now exhibited in the Acropolis Museum there. They are remarkable for the colored decoration of the abacus, here circular, by interlaced fret patterns, and of the cymatium by anthemions turned upwards and downwards (Fig. 70). Bötticher's theory of the recurved leaf 91. does not apply here.

72. The Cypriote capitals (see Golgos in Fig. 70) with their simple forms of echinus must also be of high antiquity, and have likewise received their development in the same heavy manner in

the Athenian marble stele capitals, excepting with the difference that the abacus assumes the circular form.

One of these Cypriote capitals (Fig. 70) exhibits grooves on the cyma extending in a direction nearly normal to the profile. Similarly arranged are also the varied scale-bands on the Athenian stele capital, whose colors are indicated, and whose abacus again exhibits the fret ornamentation. Other allied capitals show the recurved leaf on the echinus, as on the cushions of caryatids, or an aspiring palm decoration.⁶⁵

Note 65. We had already ten years since mentioned the possibility of the decoration of the echinus with reference to the cymas of the Parthenon and Propyleion, but in consideration of Bötticher's theory, slight attention was paid thereto. Borrmann now states: (Stelen für Weigeschenke auf der Akropolis zu Athen. Jahrb. d. Kais. Deutsch. Arch. Inst. Band III, p. 279. Berlin. 1888).

"It may not be denied that the ornament is very frequently in a quite loose relation to the structural form covered by it, and is manifestly not in the ideal combination required by Bötticher's theory. The egg-and-dart moulding is in some places without tectonic meaning, and the scale ornament is merely a covering decoration, but in nowise characteristic. The leaf-wave that separate the lower from the upper row of leaves is distinctly separated from the recurved parts and makes it at least doubtful, whether we have to accept with Bötticher the origin of the Doric cymatium as a result of loading, with the points of a series of recurved leaves". -- Consequently the ornament does not appear to be intended to manifest the statical function of an architectural member, and is then always arranged for a purpose, i. e., it closely adheres in development and direction to the movement of the profile.

A third very ancient torus form of capital exists on the columns of the Lions' Gate and of the so-called Treasury of Atreus in Mycenae. Between the square abacus and the round torus, a preparation for the transition is attempted, but its form is not definite and clearly expressed, and the transition from the torus to the shaft of the column is made by a cove, covered by a row of leaves.

The row of leaves beneath the echinus (painted) is shown by the old capital of the column of the Tomb of Xenares⁶⁶ and is sculptured on the capital from Paestum, where to the row of leaves are

are also frequently added anthemion ornaments or connecting bands (Fig. 70). In Mycenae, the entire torus was covered by plaited and volute ornaments, while in Paestum only the lower portion of the strongly projecting echinus was decorated.

Note 66. See Fig. 70; also Fuchstein, Das Ionische Capitäl. 47. Programm zum Winkelmannsfeste d. Arch. Gesell. zu Berlin. Berlin. 1887. page 47.

The old capitals in Selinus likewise have the cove between the echinus and the shaft.

A widely projecting form of echinus (dish-like) is shown by the capitals of columns on archaistic vases (see in Fig. 70 a lecythos found in Athens), by the stele capital of Xenares, and after these, the capitals of the oldest period in Paestum, Syracuse and Selinus.

The strong projection should be referred to an original rectangular form of capital, projecting on two sides only, as shown by the Athenian stele cap (Fig. 70), to which we have added a form from the Asclepion in Epidauros, certainly of a later period. The widely projecting echinus form of the narrow end of the capital is undeniable here and is technically justified after its use in Epidauros.

But in addition to the echinus, the cymatium also occurs as a characteristic part of the capital of the free column, indeed ⁶⁷ 93 above an octagonal or circular shaft (Fig. 70). The abacus then corresponds to the form of the shaft and is consequently octagonal as well as circular, and the cymatium is a connection of the cove or ogee and the recurved leaves.

Note 67. See Le Bas. Voyage archæologique en Grece et en Asie-Mineure etc. New edition by S. Reinach. Paris. 1888. Also Antike Denkmäler. Pub. by Kais. Deutsch. Arch. Inst. Berlin. 1888. Pl. 29.

The ogee or pear-shaped capital of the Francois vase and of the Athenian stele cap from the Persian rubbish has not certainly found acceptance in the stone architecture of the Greeks, just like the heavy torus of the Cypriote and of the corresponding stele caps; but on the other hand, the dish-like form with the cove with leaves came into use and was retained almost until the time of Pericles.

The cymatium also, the compound form, was not accepted for

the columns of the building, but indeed for crowning the antae. In capitals of the early period we therefore see elements introduced from Asia Minor; in the shaft, we recognize the Egyptian stone column!

According to the stele cap found in the Persian rubbish (Fig. 70), the assumption may well be permissible, that the Greeks had quite early replaced the wooden post by the stone pillar, and indeed before they introduced the massive stone columns of the Egyptians in their architecture. We have pointed out the primitive stone model for the capital and shaft of the Doric column, and in this and not in the former is to be sought the original and the transitional forms from wood to stone.

That the later Grecian stone structures are a direct imitation of wooden structures is justly contested by Hübsch, Bötticher, and Viollet-le-Duc, since this method would be opposed to reason.⁶⁸ One would make the same error by assuming the ancient Doric stone buildings to have been a direct imitation of exclusively wooden structures, as if it were desired to make it credible that they should have been primarily conceived as stone structures. If the ancient writers commonly mention old wooden columns in Grecian sanctuaries, which were gradually replaced by stone columns, both certainly had forms differing from each other. The greatest measurements of wooden columns, that we have found in old wooden buildings (on this side the Alps) do not attain the diameter of 4.26 feet required in the Heraion in Olympia, for example.⁶⁹

Note 68. Also see Dieulafoy, Part 2, p. 51.

Note 69. We cannot rise to a belief in wooden columns with clay capitals made on the potter's wheel, as Fenger suggests in order to explain its forms. Dorische Polychromie etc. p. 16. Berlin. 1886.

67. Drums of Columns.

The shaft of the column is either made of a single piece (monolithic), or it consists of numerous blocks of stone (drums) carefully set on each other and very closely touching each other on their bearing surfaces, and not being cemented together by other materials like the ashlar of the walls of the cella.

In order to easily obtain a good and beautiful joint, which

was absolutely necessary in columns for sake of appearance, especially when they were not covered by a coating of stucco, the bearing surfaces were undercut somewhat deeper towards the centre, only the annular portion near the exterior being employed for support. The margin was therefore more carefully wrought than the portion lying further inward, in which are usually found deep strokes of the double-pointed pick (Fig. 71). The annular surfaces intended for bearing were rubbed; the final preparation being effected by the rotation of one block on another about a wooden pin at the centre. The central parts of the beds have at the centre holes about 5.1 in. square and deep, in which prismatic wooden blocks were fixed, which were connected together by cylindrical wooden pins. The latter were fixed in one (lower) block, while the upper one was movable about them, thus permitting rotation without moving the centre of the stone out of position. If these wooden blocks had only been required for fixing the drums, their complicated form would have been unnecessary. The material for fixing them would not resist for a long time, and they were also too small in proportion to the dimensions of the blocks. In spite of the undercutting of the central portion, the bearing surface is large in proportion to the load. On the lowest drum at the Parthenon, it measures 27.38 sq. ft. - 8.45 sq. ft. = 18.93 sq. ft.; the weight of the drums above it, and of the corresponding portion of the entablature, ceiling, and roof, is about 149 tons; it is therefore loaded with about 7.87 tons per sq. ft., while marble commences to crush under a load of 180 to 450 tons per sq. ft.

The lowest drum is not connected with the finished step of the stylobate by pins and is not sunk into it, but is only freely placed upon it. ⁷⁰

Note 70. An exception is made by the Temple of Hercules in Agragas and the Sanctuary of Athene in Pergamon and others.

97. 68. Position of the Columns.

The columns do not stand vertical in Attic monuments and on the Temple of Poseidon in Paestum, but are somewhat inclined towards the wall of the cella, and the angle column in the direction of the line bisecting the angle of the stylobate. The inclination is very slight, but is plainly visible to an eye skilled by practice. The inclined wall has the inclined column

as a result.

Optical and structural reasons can scarcely have required the slightly oblique position; the diminution of the columns, the receding of the length and breadth of the entablature as opposed to the stylobate already gives to the structure in a very realistically expressed way the character of pyramidal aspiration, and the externally weak addition of the inclination of the columns was not required for this purpose; with the thick and massive form of the free supports, this has no importance for any structural purpose. An ancient Egyptian architectural law was evidently followed in this, which certainly no longer had much meaning in this weakened form: but it was also perhaps desired to lessen in the portico the divergence of the two enclosing surfaces, of the wall of the cella and of the columns. (Compare Parthenon, Theseion, and Propyleion in Athens, Temple of Poseidon in Paestum).

The inclined position of the columns was effected in execution by the insertion of drums with diverging beds between those with parallel beds (Figs. 72, 73).

The first of these was laid on the step of the stylobate and the last was beneath the capital. The axis of the column then rose perpendicular to the upper base of the lowest drum, the successive drums with parallel beds being arranged parallel to this. The lowest and uppermost drums of the buildings named measured on their external surfaces in an intersecting plane perpendicular to the cella wall, consequently do not exhibit equal heights; the upper drums further show the greater height on the side opposite that of the lower, since a horizontal resting place must be arranged for the architrave. (Compare the construction of the columns of the Parthenon).

At the ends of the Parthenon (the sides are destroyed at the centre), the uppermost and lowest drums exhibit another peculiarity, since they also have different dimensions on their surfaces on a plane passed through their centres parallel to the tympanum.

96. The larger measurements on the lower drums are in most cases on the surfaces towards the sides of the building (to right and left of the centre of the building); the reverse occurs on the uppermost drums, where the greatest measurements are found on that side towards the middle of the building.

The differences between the two surface lines of the lower drums are not uniform, but diminish from the angle column towards the middle of the building for drums varying an inch or so in height, though not constantly or uniformly to right and left, so that omitting the angle column, the following differences in measurements result for drums averaging 2.89 to 3.11 ft. in height.

97. Inches. .472 .354 .118 .000 .118 .472 on East end.
Inches. .394 .197 .079 .197 .275 .275 on West end.

With some forcing and in accordance with an imperfect passage of Vitruvius, one might conclude that a further arrangement of the axes of the columns was intended, were it not that the equal and unequal measurements on the lowest drums in a direction at right angles to the wall of the cella permit the possibility of indeed very slight inaccuracies in the preparation of the surfaces on which they rest, which might easily occur with the mode of construction described, and that the deformations of the stylobate make any positive conclusion impossible.

Differences in Inches.

1.575 1.024 1.024 1.024 0.945 0.945 0.945 1.457 on East end.
1.220 1.221 0.787 ----* 0.984 0.866 0.866 1.535 on West end.

* Note 71. *Can no longer be measured.*

Height of Drums.

2.82 to 3.22 ft. on East end.

2.92 to 3.48 ft. on West end.

Considering the deformation of the stylobate and the differences in measurements of the lower drums, if the positions of the axes be laid off, which may best be made clear and visible by a disproportionate increase of the measurements of the heights, the irregularities appear disturbing, though scarcely visible in reality, according to the graphical representation in Fig. 74, but it will hardly occur to a practical man to deduce from these imperfections special rules for the construction of buildings. The Parthenon and Propyleion have withal suffered so much from destruction in all ways, that we cannot declare everything now found to have been originally intended in its entire extent.

69. Technical Execution.

The practical construction of the columns may have been as follows. The drums were first dressed roughly to a circular

form, though the beds were already dressed smooth; for more convenient transportation and perhaps also for hoisting (setting), there were left on the external surface 4 strong bosses diametrically opposite each other (projecting 7.87 ins. and 16.56 ins. wide), shown by unused and unfinished drums on the Acropolis at Athens. These were placed on each other in this condition (as shown by the unfinished Temples at Egesta and Sardes), the flutes being worked as guides on a certain height of the lowest and uppermost drums alone, and only completely cut out after the completion of the building.

70. Quarrying and Dressing of Shafts.

By a carriage drive of 1 3/4 hours over a good road, one now goes from Castelvetro to the stone quarries of Selinus, the Cave di Campobello, which now afford us information in regard to the mode of quarrying the shafts of columns and ashlar for the Temples of Selinus.

The shafts were not cut out of loosened prismatic blocks there, but the high drums were cut out of the rock in circular form and dressed smooth on the external surface with due regard to the diminution. Narrow annular passages 1.97 to 2.63 ft. wide were cut out around each piece of a shaft, in which the stone-cutter had to undertake its cutting and preparation by the pick. As if shut into cells, which are merely separated from each other by narrow spaces, and whose walls are cut parallel to the diminished shafts of the columns, the blocks still stand there fast to the solid rock; they have a diameter of 10.16 to 10.75 ft. with a height of 12.62 ft. Only after this preparation, which was justified by the great dimensions of the blocks and the thereby increased difficulty of moving them, were they detached from the rock, for a groove 8.25 ins. wide and 15.7 ins. deep was first cut around the shaft at the bottom, after which they were detached. (Fig. 75).

Dressed and loosened drums ready for transportation lie in the vicinity of the still fixed blocks. These massive stones must have been moved about 7.5 miles over a hilly country to the site of the building.

For quarrying ashlar for walls, we find that the ledge was broken off vertically for a depth of 3.28 to 19.7 ft. The upper surface was dressed off horizontally; channels 5.9 to 7.1

ins. wide were cut therein around ashlar 4.92 by 3.94 ft. and 1.97 ft. high.

For the Ionic columns of Temple G, the preparation of the columns in the quarry was carried still further, for the outer surfaces were dressed off in polygonal form according to the number of the flutes, these prismatic surfaces being again separated from each other by fillets, which corresponded to the latter widths of the fillets between the flutes of the finished columns. Then after the erection, it was only necessary to cut out the flutes; all other arrangements for them having been previously made.

It was 2300 years since, that the invasion of the Carthaginians put a sudden end to this stone-cutting.

In Egesta the drums were of different heights, varying in dimensions from 3.05 to 4.14 ft., and are throughout dressed with 100 parallel surfaces, so that an inclined position of the columns in this temple is not certain. ⁷² The same may also be observed on the Temples of Akragas, so that the rule shown on the Attic Doric monuments has an exception throughout Sicily. It must likewise be noted as an exception, that the lowest drums of the columns and the stylobate blocks supporting them in the Temple of Herakles in Akragas exhibit holes for pins, which are evidence of a mechanical connection of these drums with the slabs of the stylobate. The columns of the Southern side of this Temple have been moved outwards by earthquakes, and therefore all the holes for dowells are visible, both in the stylobate and in the bearing surfaces of the lowest drums.

Note 72. Hoffer also gives in Allg.-Bauz. 1838, Pl. 238, the dimensions of the sides of the drums somewhat different from those in Fig. 74. The differences for the angle columns result from the mode of measurement, when he takes the measures in a plane similar and parallel to the pediment facade, while they were taken diagonally by me. Otherwise, the differences (see Fig. 74) only amount to .039, .078, and at most, .118 inch, which might result from inaccurate scales and from the incrustated external surface of the material. For the 6th column from left to right, Hoffer gives 3.45 ft. for the inner external surface, while I have written 3.48 ft. An error occurs here, whose correction would move the axis more to the left.

A connection of the drums of the columns with the stylobate slabs by dowells is likewise shown by the columns of the Sanctuary of Athene Polias at Pergamon. The sites of the columns exhibit round holes with grooves for pouring in lead in which were fixed round pins 3.15 ins. in diameter. Square holes in the drums of the columns correspond to these.; the latter had beds rubbed all over, so that they touched over their entire extent and not merely over a border or ring. The slenderer proportions of the columns of the later period (here the 4th Century B.C.)⁷³ indeed caused the changed practice.

Note 73. See Eohn. Alterthümer von Pergamon. Band 2. Berlin. 1885. p. 22.

A very complicated and detailed preparation of the flutes is shown by a never finished drum on the Acropolis of Athens (Fig. 70), and of especial interest should be the mode of joining the marble floor slabs beneath the Poros columns in the cella of the Temple of Zeus in Olympia (see Fig. 54) with the beginning of the flutes on the former.

For accurately locating the centre of the column, the arrangement was employed in the Temple of Zeus in Olympia (West side), that at about the centre of the stylobate slab, which was to receive the column, a hole was cut about as large as the hand, and this was filled with lead and leveled off. The centre of the /0/ column was then marked on the lead by two lines intersecting at right angles, and it was afterwards set. The porous building material in Olympia made this precaution appear necessary.

After the column had been carefully dressed circular with due attention to the entasis, lines drawn on its surface and extending from the upper to the lower guides traced the intersections of the flutes, the hollows then being worked out between these according to fixed templates. From this also resulted their unbroken and stiffly rising course, exactly fitted to each individual drum, as well as to the varying diameters of the columns, though these differ but slightly in Attic monuments, and probably also to the unequally great entasises. These irregularities are frequently quite important in older monuments; on the Temple of Zeus in Olympia, the diameters of the columns differ from 1.97 to 3.54 ins. (in 7.22, 7.38 and 7.51 ft.), and even as much as 11.4 ins. on the Heraion in Olympia, though indeed there for oth-

er reasons. The angle columns in some temples are slightly larger in diameter than the others; yet they all stand along the upper step of the stylobate always at equal distances from its outer edge. (Compare Parthenon and Heraion in Olympia). So slight an enlargement of the angle columns above the others, generally but a small portion of an inch for so great a diameter and small height, contributes nothing to their greater resistance and stability, so that a statical reason for this arrangement may not be assumed; on consideration of the structure, the close spacing of the columns does not without some additional reason leave any basis (which is quite impossible in many cases or must be wilfully sought) for the view, that as the angle columns stand isolated against the sky, they consequently appear of less diameter than the others, so that neither does any optical reason require their enlargement. In case of columns having a necking with a single incision, the intersection of the flutes of the necking, worked on the capital and the uppermost adjusting drum, are separated from each other by a projecting band (scamillus) about .039 in. high. Both portions were nearly finished before being set, at least the upper half of the drum, and this precaution was required to prevent the angle from being broken away in being set. A similar projection is likewise found on the abacus to prevent injury of the angle, when the architrave was placed upon it.

The contact surfaces of the uppermost adjusting drum and of the necking of the capital are not parallel to the upper surface of the lowest drum in the Parthenon; with a constant penetrating axis assumed mathematically, the two could not be in circles, and also no circular form was the basis of the annulets and echinus. On the eastern end, the differences in the side lines of the adjusting drums vary as follows:--

From west to east sides, taking the columns from south to north.

0.533	0.620	0.551	0.533	0.562	-----	0.492	0.453	in.
0.315	0.289	0.207	0.114	0.045	0.249	0.232	0.533	in.

A fixed and uniform increase or diminution from the middle toward each side is as little to be based on these figures, as was found possible in the case of the lowest drums.

With the still large upper diameter of the columns, (3.77

to 3.87 ft.) and the slight differences in the side lines, only amounting to a small portion of an inch, i.e., with the slight divergence of the beds, the ellipse would actually differ very slightly from the circular form, had not a slight deflection of the axis of the upper drum solved the problem more simply, and as a matter of course, made the surfaces circles.

However perfected the execution of the masterpiece of Iktinos was and is still so in part, yet slight defects in workmanship slipped in, such as are shown in the unequal spaces between the columns, both above and below, the different dimensions of the abacuses of the different columns and the different heights of the columns, with the divergence of their axes, though as already indicated, some disturbances must be attributed to the explosion of powder and the destructive bombardment, which the building suffered.

In spite of the slight practical value, that these given measurements have in regard to the general execution and for our judgement of the effect of the building, we must dwell on them somewhat longer for other reasons.

On the small Doric columns in the interior of the Tower of the Winds at Athens, another peculiarity is still to be noticed, which is not elsewhere found on Doric columns: the flutes are furnished with the so-called "pipes" (cabled ?) for a third of their height (upwards from the base). On the low monolithic and fluted, certainly not Doric columns of the two porticos of this monument, the flutes were lighter and better cut before setting; but to prevent injuries to the fillets and beds, the flutes were not completed at four points; the bosses between the fillets still remain visible at an inch or so above the floor (Fig. 77), which may have served for lifting them and for the use of the

71. Intercolumniations.

(crow bar.

The distances of the columns from each other are in part determined by certain arrangements in the frieze; it is normal for the axis of the column to coincide with the middle of the triglyph, and so that from the axis of one column to that of the next, there are two metopes with a triglyph between them. If the metopes are now assumed to have equal widths and a triglyph be placed at the angle, it is no longer possible for the axis of the angle column and the middle of the triglyph to coincide;

therefore the intercolumniations between the angle column and those next adjoining it on the end and side depend on this arrangement, i.e., they must become less than the intercolumniations between all the other columns, which moreover, intentionally or unintentionally, do not always show equal distances from centre to centre. Thus on the Parthenon, for example, this masterpiece of antique skill, the intercolumniations should be equal, but often vary as much as 2.16 ins., while the columns of Sicilian monuments are intentionally set with different intervals, so that the distances between the axes of the columns standing beneath the centre of the pediment are greater; the intercolumniations gradually increase from the angles to the centre in this case (Fig. 78).

These differences in the distances between the axes of the columns evidently produce similar ones in the metopes, so that the latter can no longer have exactly equal widths.

Vitruvius distinguishes five different modes of arranging the columns:--

1). The closely set mode (Pycnostylos): Intercolumniation equal to $1 \frac{1}{2}$ diameters of the column.

2). The more extended arrangement (Systylos): 2 diameters.

3). The still more widely spaced arrangement (Diastylos): 3 diameters.

4). The excessively wide or distant arrangement (Aerostylos):

5). The arrangement with proper proportions (Eustylos): $2 \frac{1}{4}$ diameters:-- for the middle columns 3 diameters.

Our authority states in regard to 3), that the architrave breaks easily on account of the wide intercolumniations; that neither a stone nor a marble architrave could be employed in 4), but continuous wooden beams must be laid on the columns.

104. If we investigate the ratios of intervals to diameters of columns in Grecian monuments of the Doric order, the following values will be found for the given temples.

Monument.	Intercolumniation	Actual length architrave end to end.
1. Cadacchio.	$2 \frac{3}{5}$ low. diams.	7.48 ft.
2. Heraion in Olympia.	$1 \frac{3}{4}$	10.73
3. Selinus, Temple D.	$1 \frac{3}{5}$	14.37
4. Selinus, Temple C.	$1 \frac{3}{5}$	14.63
5. Egina.	$1 \frac{3}{5}$	8.53

6. Theseion.	1 $\frac{3}{5}$ low. diams.	8.56 ft.
7. Phigaleia.	1 $\frac{1}{3}$	9.06
8. Parthenon.	1 $\frac{2}{5}$	13.98
9. Corinth.	1 $\frac{2}{5}$	12.53
10. Selinus, Temple A.	1 $\frac{1}{4}$	9.81
11. Egesta.	1 $\frac{1}{5}$ to 1 $\frac{1}{6}$	13.88
12. Propyl. in Athens.	2 $\frac{3}{5}$	17.81

Middle entrance.

Consequently, neither one of Vitruvius' appellations is applicable to any of these arrangements of columns, the numbers 1 $\frac{1}{2}$, 2, 2 $\frac{1}{4}$ or 3 not being found among those given.

One would give himself up to delusions (as shown by the given actual magnitudes of architraves), were he to judge of the actual length of the architrave extending from centre to centre of the columns from the numerical ratio of the diameter of the column to the interval between columns, without knowing the actual diameter of the column. The architraves of the Fountain-Sanctuary (Temple ?) in Cadacchio and of the Heraion in Olympia appear long in comparison with other temples, if one is ignorant of the actual distance between the axes of the columns or the magnitude of their diameter, and assumes a long architrave, and the use of the numerical ratio by itself led to the assumption in error, that with such "wide spacing" of the columns as in these two monuments, the architraves must have been of wood. This may possibly have been the case, but not by reason of the assumed wide spacing!

With equal distances between axes or length of architrave, an arrangement of columns may be Pyknostyle, Eustyle or Diastyle, while the bearing surface of the architrave is diminished or increased, and the diameters of the columns are correspondingly lessened or increased. (Fig. 79). The Eustyle arrangement may be quite bold and cause a very small strain on the architrave; merely compare the Temple in Cadacchio with the Propyleion in Athens; both monuments have the numerical ratio of 2 $\frac{3}{5}$, while the length of the one architrave exceeds that of the other by 10.34 ft.

It is also an error for one to assume that the architrave constructed of common limestone required a closer arrangement of the columns, and that the use of marble first permitted a wider

spacing. The Sicilian temples of limestone with a numerical ratio of $1 \frac{3}{5}$ exhibit architraves with lengths averaging 14.44 ft., while Attic monuments of marble with ratios of $1 \frac{3}{5}$ and $1 \frac{2}{5}$ (Theseion and Parthenon) only show lengths of 8.56 and 15.98 ft.

72. Columns and Cella.

According to the arrangement of the columns about the cella, Vitruvius distinguishes between the following appellations:--

105. a. Arrangement in antis (Naos en parastasin) or Antae-temple, if the end wall of the temple is changed so that two columns stand between two antae.⁷⁴

Note 74. Antae in Latin ~~is~~ parastades in Greek.

b. Prostyle, if another row of columns is placed at a certain distance in front of the antae and columns of the antae-temple, and these are connected by an entablature continued on the right and left on the walls of the cella.

c. Amphiprostyle, if the same arrangement as in b is found in front of both pediment walls.

d. Peripteral, when the cella is surrounded by columns with 6 at each end and 11 at each side, including the angle columns.

e. Pseudodiptera, if 8 columns stand at each end and 15 at each side, yet so that the walls of the cella must correspond to the third column from the angle, and also that entirely around it a distance of two intervals between columns and one diameter of a column remains between the wall and the colonnade.

f. Dipteral, if 8 columns are at each end and double colonnades extend entirely around.

g. Pseudoperipteral, if the walls of the temple are inserted in the intervals between columns and the area of the portico is raised and added to the cella, which thereby experiences a material enlargement.

The given number of columns, arranged in the proportion of 6 to 11 or 8 to 15 (breadth to length) is retained in the least number of monuments; a tolerably great variety prevails here; the true number is not even invariably retained at the end, as the subjoined examples show:--

Metroon in Olympia	6 to 11
Fountain-Sanctuary in Cadacchio	6 to 12
Temple on Egina	6 to 12
Temple of Zeus in Olympia	6 to 13

Theseion in Athens	6 to 13
Temple in Nemea	6 to 13
Temple of Hera in Akragas	6 to 13
Temple D in Selinus	6 to 13
Temple A in Selinus	6 to 14
Temple in Egesta	6 to 14
Temple of Poseidon in Paestum	6 to 14
Temple S in Selinus	6 to 14
Temple of Athena in Syracuse	6 to 14
Temple in Phigaleia	6 to 15
Temple E in Selinus	6 to 15
Temple of Hercules in Akragas	6 to 15
Heraion in Olympia	6 to 16
Temple of Zeus in Selinus	6 to 16
Temple C in Selinus	6 to 17
Artemesion in Syracuse	6 to 18
Temple of Zeus in Akragas	7 to 14
Parthenon in Athens	8 to 17

106.

9). Antae.

73. Form.

The Antae (parastades or wall-end-piers) give the necessary architectural ending to the side walls of the cella, extended beyond the transverse walls, as bordering bands, narrow or of the same width as the columns, and only slightly projecting from the plane of the wall; like the columns, their height is divided into three parts, also consisting of a Base, Shaft and Capital.

The antae are so formed in plan, that the projection outwards from the side wall of the cella corresponds to the full thickness of a column, as in the pronaos of the Theseion, or it merely forms a band, very narrow in proportion to its height, as in the opisthodomos of the same temple; on the side of the wall turned inward with columns between antae, the antae have a width equal or similar to the diameter of the columns (Compare Egina and Phigaleia); but with a colonnade placed in front, as in the Parthenon, all projection on this side is omitted. The front surface of the pier is in all cases but an inch or so wider than the thickness of this portion of the cella wall.

The antae are required to follow the inclination of the walls and columns (Fig. 80); they are also diminished like columns in

many cases and in a very strongly expressed way in the so-called Basilica in Paestum, less so and but a few inches in Phigaleia (3 and 3.59 ins) and on the Parthenon (4.61 ins).

On one of the temples in Selinus, the regular antae give place to a fluted three-quarter column, whose centre coincides with the centre of the wall, a less skilful solution of the termination of a wall and unworthy of imitation (Fig. 80).

The base of the antae is in most cases only formed by the projecting lower ashlar course, and it accordingly receives the same treatment as the lower part of the wall itself: with a richer treatment of that, a lower base is used (reverse o-gee with narrow band), returned around as on the Theseion.

The surfaces of the antae remain absolutely plain and without ornament; only the fine bed joints of the courses of stone intersect them, beint continuous with the joints of the end walls.

The capital is somewhat heavily treated in the older Sicilian temples; the uppermost course slightly projects beyond the surfaces of the antae and is decorated by a recurved leaf-moulding with a thin abacus above it; on the buildings of the perfected style, fillets or narrow bands below the projecting leaves are added to this profile, and a delicate crowning moulding is added to the abacus. The ornaments of the different portions were not sculptured in relief, but were merely painted on them. (Fig. 80).

A peculiarly archaic and heavy treatment is shown by the antae capitals of Paestum, while those of Phigaleia exhibit the most aspiring and freest forms (Fig. 80).

The antae on the Heraion in Olympia were made of wood, since the upper portions of the walls of the cella indeed consisted of unburnt bricks, which required especial protection at a free ending. Arrangements on the floor and the lower courses of ash-lars (Figs. 81, 82) afford assured evidence of this. Anchor holes are cut in the thresholds and double dovetail grooves are cut in the lower ashlar course to receive inserted strips to hold the board wainscoting and project it from injury. (Grooved-in cleats, such as we have in our drawing boards and table tops, were already known to the ancient Egyptian joiners, as shown by some small wooden chests in the Gizeh Museum at Cairo. Also see the succeeding volume of this Handbuch, Fig. 205, p. 227). The

vertical grooves in the stone are further undercut in order to prevent the loosening of the protecting boards.

The form of the stone antae as narrow wall strips is indeed connected with a reminiscence of the ancient construction in wood, from the period in which the mixed mode of building in masonry and wood was in use.

108 The primitive form of the commended antae capital at Paestum is also to be found on ancient rectangular steles. The cymatium (ogee moulding) first occurs on the works of the later time and of the best period, and its invention dates back to the 7th Century B. C., according to Puchstein (p. 52, 53), (between the building of the Treasury of the Geloans and that of the great Temple on Selinus). It first occurs on clay objects and in architecture on the wooden and stone members covered with terra cotta (Metapontum, Olympia, Syracuse, Selinus), and thence finds its way into stone architecture.

10). Architrave.

74. External Form.

109 The Architrave (epistyle or under beam) spans between the columns and consists of massive blocks of stone, rectangular or square in section, which extend from centre to centre of the columns. they repeat the form of the building already given in the stylobate, receive the load of the frieze, cornice, and ceiling lying above them, as well as a portion of the weight of the roof, and transmit the entire loading to the powerful columns that oppose it.

75. Decoration.

Only in small monuments are the architraves cut from solid blocks; 2 or 3 are placed side by side in larger ones. No decoration of any kind can any longer be traced on their under surfaces. merely the one or two fine lines of the joint between them occasionally appear in the marble monuments, while in stuccoed or polychrome architecture, these also disappeared beneath the coating of stucco.

According to the example of the decoration of Roman architraves, where older models were certainly imitated, the under surfaces may have been ornamented by painted bands, interlaced bands, etc.

The front surface is now simple and plain on most temples and must originally have not been so void of ornament as is repeat-

edly assumed; but least of all should this be considered as a part excluding decoration.

The Temple in Assos had representations in relief on the front surface of the architrave containing numerous figures; Sicilian terra cotta cornices exhibit continuous scroll ornaments there and horizontal stripes with sea waves; even the architrave of the Parthenon received its metallic decorations at the pediment end, although perhaps only in the time of Alexander, the golden shields beneath the metopes with the inscriptions between them; the iron pins forming a triangle on the side architraves of this sanctuary are continually repeated and permit a further decoration to be inferred (Fig. 83).

Pausanias says of the Temple in Delphi: "Golden weapons hang on the architrave; the shields were dedicated by the Athenians for the Battle of Marathon, and the weapons on the rear and the left side by the Aetolians, especially as the weapons of the Galatians. They very closely approach rectangular Persian shields in their form". Also at the Temple of Zeus in Olympia, he saw "21 golden shields, gifts of Mummius, on the external architrave extending around above the columns".

Of the last, the German expedition only found on the "Metope blocks" of the eastern front, circular surfaces free from stucco and with holes for dowells and strips of copper, and accordingly correctly assumed in the reconstruction of the temple facade, that the architrave was without ornamentation.

76. Upper Termination.

The outer surface of the architrave is ornamented at top by an abacus member or projecting band, and suspended from this at certain intervals are regulas with or without the so-called drops, small cylindrical or conical forms. One such regula corresponds to each triglyph in the frieze. The band was usually made perfectly plain and only received painted ornamentation, for example, a fret pattern as on the Parthenon; or it consisted of a round between two fillets on older monuments, as on one temple in Selinus; it gave place to a leaf or egg-and-dart moulding with a lower band on the Temple of Demeter in Paestum. The regulas are only recessed but little in the best period, being in section rectangular fillets extending the width of the triglyphs, while they are trapezoidal in section on older monuments (Assos), or are somewhat curved on the front surface (Se-

linus, Fig. 84). On the Parthenon, they were decorated by a painted palm-leaf ornamentation turned downwards, and were therefore characterized as a suspended decoration.

Note 77. On the older great temple on the Acropolis of Athens, as shown by the fragments in the wall of Cimon, the regulas with drops were somewhat wider than the triglyphs.

On the Temple in Assos, these regulas are left without any further appendages; on the so-called Tomb of Absalom, they bear 4 suspended knobs or drops; there were 5 of these on the Bulwark at Olympia, and generally 6 on the monuments of the best period.

The drops differ but little from the cylindrical form in most cases, and therefore diminish but slightly (Parthenon, Theseion), or they are perfectly cylindrical (Selinus); their greatest circumference touches the architrave, or they hang free (Fig. 84).

These regulas and drops are usually preparatory to the triglyphs and are regarded as belonging with them, as organically necessary; but they also occur on the architraves of the side walls and on colonnades in the interior of the temple. At the same distances as on the architrave, they are suspended beneath the figure frieze of the Parthenon, above and between the columns of the central aisle of the Temple on Egina, and also beneath the entirely plain external frieze of the cella of the same temple. In the last case, the significance and preparatory function of a certain architectural member ends in a definitely different purpose; but the regulas must or may recall the primitive forms of the frieze and points out the deception, that occurs here.

77. Internal Surface of the Architrave.

The inner surface of the architrave exhibits a simpler treatment. It is either quite plainly treated, as on the Parthenon and the Temple of Zeus in Olympia; it projects somewhat beyond the frieze on the first named monument; it lies in the same plane with it in the latter, and after covering the joints and divisions of the frieze with a coating of stucco, it represents a single great surface extending to the moulded course supporting the ceiling beams. Or the inner surface is merely crowned by a narrow border (fillet or ogee) without further accessories

(Compare Propyleon and Theseion at Athens). Only on the Temple of Nemesis at Ehamnus are regulas and drops described on the inner surface of the architrave also, above which is a plain frieze, crowned at top by a broad band.

78. Construction.

The blocks composing the architrave in marble monuments usually have equal widths: in those of porous limestone, which received a coating of stucco, they frequently differ in size, so that on the Temple of Zeus in Olympia, for example, the three architrave blocks placed side by side measure 2.58, 1.67, and 2.33 ft. in width.

^{1/2} The separate blocks only touch each other along narrow borders about 2.36 ins. high, the remainder of the surface of the joint being roughly pointed back, and frequently so much, that the space between two blocks is often 9.45 ins. at the centre. (Compare Propyleon at Athens). The bearing strength was not lessened by this stone-cutting, but a more accurate and finer joint was made possible more easily.

The height is also divided in ⁷⁸courses for the architraves of the gigantic Temple in Akragas and for an entablature found on the Street of the Treasuries at Olympia; the separate courses have the considerable height of 3.94 and 3.28 ft. in the first case, while they are but 1.10 ft. high in the second, with a width of 2.26 ft. (Fig. 85).

Note 78. Hittorf, Taf. 89 and p. 309, found square grooves on the under surface of the lowest architrave blocks, which extended beyond the greatest projections of the capitals. He believes that marks of rust were discovered in these grooves, and concludes from this that iron bars were inserted in them, since the stone alone was not in condition to support the stones lying thereon.

The stones of the Olympian entablature only touch on margins of the horizontal bed surfaces, so that the beds of the separate blocks are barely covered at the margins. On the Temple of Demeter at Paestum, the crowing ogee moulding is not cut on the same block as the architrave, but on separate stones, laid on the other. The external architrave blocks abut against each other at a right angle; the internal ones join obliquely, being mitered at 45°. (Compare Fig. F; also Egina and Olympia).

The separate blocks are carefully held together at the abutting joints by iron I-cramps set in cast lead (like the stones of the cella walls); they generally rest freely on the columns without the use of any means of fixing them.

113. The greatest strain on the architrave beams may perhaps actually occur on the blocks over the middle passage of the Propyleion in Athens. This architrave consists of two parts and is 17.82 ft. long, its width is $2 \times 2.36 = 4.72$ ft., and its height is 3.77 ft.; so that it has a sectional area of 17.83 sq. ft. The volume of the frieze, cornice, tympanum and pediment cornice amounts to $(4.72 \times 17.82 \times 13.48 \text{ ft. high}) = 1133.7 \text{ cu. ft.}$, one cu. ft. of marble being taken as weighing 168.55 lbs., which gives 191,150 lbs. as the loading of the architrave, that has at each end a bearing of about 24 ins.

In the older temples with a mixed system of construction, and on those having enclosing walls of unburnt bricks, the architraves and the ceiling beams above them were certainly of wood. The lack of all parts of the cornice in many ancient temple structures on the one hand, and the peculiarities of the known material of the wall on the other, as well as the written evidence, make this tolerably certain. The supports of the architrave outside the cella walls may likewise have consisted of wooden posts; but these may also have been replaced by stone pillars.

The form of such a wooden architrave was indeed the simplest imaginable, as required by the statical function of this architectural member. Their dimensions were suitable for the pillars, and so long as wood was used, practical dimensions were not abandoned.

But with the acceptance of Egyptian stone columns must occur a change in the entablature, whose primitive arrangement we have seen in the Lycian rock-cut tombs (Fig. 86). The dimensions of the timbers must then become proportional to the columns, and instead of beams or borders (see Fig. 86; by referring to Fig. 86, it is not stated that we believe the rock-cut tomb to be very ancient, but indeed that a very ancient wooden architecture is imitated in it) and of the closely placed round timbers, strong girders of a single piece or of rectangular beams laid on each other were employed. The terrace roof or

convex clay roof, as we have seen it on the architecture of the Francois vase, was succeeded by the gable roof, that as we will explain later, might continue to be a kind of clay roof. (Fig. 87). From the diameter of the columns was then developed or deduced the size of the entablature, and if it were desired to increase the magnitude of the temple, wood must be entirely abandoned, unless something mean were to be created.

The external form of the wooden construction and of its covering by terra cotta then affected the motive for the stone architecture of the entablature (architrave, frieze, and cornice) with its severe and harmonious decoration.

11) Triglyph Frieze.

79. External Form.

If the architrave formed the first connection of column to column, if it was the supporting beam for the parts lying above it, then in this sense it must have first received the ceiling beams of the temple and its porticos. This succession of the structural parts was retained in Ionic stone monuments, but not in Doric. The ceilings of the external porticos in the latter, in the still preserved stone monuments of the best period are, or were composed of coffered slabs arranged side by side (Parthenon), or of separate stone beams with coffered slabs laid between them (Theseion), but which in both cases rested directly on the frieze, and not on the architrave.

While the Ionic system of construction entirely concealed the ancient wooden construction in the later stone construction and obliterated in different buildings all reminiscences thereof in respect to forms in the frieze and cornice (for the dentils also disappeared; see Erechtheion, Nike Apteros), on the contrary, its arrangements were retained in the interior and were accurately imitated in stone; the Doric system of construction had given up the imitation of the ancient wooden construction in the interior and had abandoned the reminiscences thereof on the exterior of the building, -- in the frieze and in the cornice. These were the ends of the beams and the closing boards between them with their projecting cleats and fastenings, the triglyphs, metopes, taenia, and regulas with drops!

The peculiarly and energetically subdivided frieze rests on the architrave, and it is one of the most decisively expressed and

characteristic indications of the Doric style and shows on its exterior at fixed intervals narrow vertical blocks of stone with channels and chamfers--triglyphs--, which are decorated at top by a head-band, that shows a slight projection on its front side only. The intervals are in many cases closed by slabs, plain or decorated by figure reliefs, usually appearing square externally, or in other cases by solid blocks--metopes--, which have a head-band at top somewhat lower than that borne by the triglyphs.

The triglyphs are regarded by Eötticher and others as "short pillars" for supporting the cornice lying above them, as jambs of windows for light, of the originally open interspaces, which had then served for lighting the cell; that they also originally further concealed behind them the subdivision of the ceiling of the room, and consequently stood free on three sides, and only when ^{no} windows were required, did they receive on both sides the slabs that closed their interspaces. The vertical grooves were cut on the three free surfaces, and therefore, "since they were grooved on three sides", -- they received the name of triglyph. Others accept the grooves on the front surface only and count two full channels with a half channel on each angle as three grooves--triglyph.

The "originally" open space between the triglyphs is usually based on the passage from the *Iphigenia in Tauris* of Euripides (verse 113) (year of first performance probably 414 B.C.), which runs in the manuscript:--

"Ora de g'eiso triglyphon opoi kenon"

"Demos kathenoi---.

Which translated verbatim is (since eiso signifies in, into):. "But look in the triglyphs, where (perhaps) is a free space to lower the body down"---, and which certainly does not make much sense. Another mode of writing is :- "Ora de g', eiso--". "But look to it whether within the triglyph may be an empty space--". This meets with the same fate. The words are held by philologists //6. to be corrupt, because Blomfield prefers to read "geisa" instead of "g'eiso", and Nauck conjectures "chreon" instead of "kenon". Besides, "opou" and "eipon" are suggested for "opoi". Therefore all the words are doubtful with the exception of the blameless "triglyphon". Consequently, not much is proved by this verse.

Moreover, Euripides describes a barbaric-heroic arrangement, which must have occurred more than five hundred years previous to his time. Nominally born on the day of the Battle of Salamis, he was acquainted by personal examination only with the temples that originated after the Persian war; whatever temples of an earlier era remained in existence outside the mother country and could be known to him by report, indeed preceded the creative period of the poet by 150 years, but even on these monuments lying nearer the heroic era, we find no Doric frieze with window openings, and with gifts and vessels placed therein.

Viollet-le-Duc indeed also assumes that in the oldest buildings the triglyphs were stone blocks, which were required to support the cornice while the metopes remained void; he desires to consider the channels on the triglyphs as characterizing the latter as supports, while his countrymen De Saulcy and Prisse d'Avennes are of another opinion and renounce the structural significance of the component parts of the frieze. Semper likewise says that the Triglyph-and-metope frieze originally had nothing in common with the construction, but that it was probably an indented border representing a margin and was of textile origin. "The Doric style employs in the triglyph a symbol, which with some probability may be referred to this border-termination appertaining to the nature of clothing and the textile art. In this case, the triglyph would form a curtain and appear as an indication of the internal ceiling (the Pteron). In a similar manner, J. Braun assumes them to be the suspended flaps of a heavy decorative ceiling, which are separated from each other by portions of equal size cut out (metopes), and are firmly held by a common band stretched over their lower ends, below which appear the drops.

The metopes were indeed always intended to receive figure sculptures, ornamentation either painted or executed in relief; either a palm ornament developing itself outwards from the centre of the field, or a representation of figures. The latter then generally exhibits an episode of a combat or particular deeds of certain gods or heroes, or they express animated battle scenes, or scenes with a quiet and peaceful meaning. The decoration of the frieze by a continuous composition full of meaning and completed, was not intended, but only the representation of small scenes with usually but two figures, on which was based the separation by architectural members.

80. Triglyphs.

Moved back into the same plane as the front of the architrave, the triglyphs of the Parthenon stand as small upright aspiring pillars, whose front surfaces and a small portion of their side surfaces were first dressed smooth, while the portions lying within the frieze only show the quarry working. The front surface was decorated by two channels of triangular section rising from the architrave almost to the head-band; they terminate almost horizontally at top, the angles being merely somewhat rounded off. The rear angle of the channel is carried up higher than the front angles lying in the surface; a strong under cutting (Scotia ?) is therefore found at the end of the channel for producing a more animated effect of shadow there. The angles of the pillar are chamfered; the chamfered surfaces are parallel to those of the channels and likewise terminate with a deeper, cavetto-like undercutting like a suspended knob, also forming a part of the rectangular edge (Fig. 88). A narrow head-band is dressed smooth and projects only on the front side and crowns the pillar, while a delicate beaded astragal borders this in front and on the sides, where it joins the projecting cornice, therefore being above the head-band (Parthenon). A similar treatment is shown by the other Doric monuments of the age of Pericles, except that the crowning beaded astragal is wanting on the Theseion; it gives place to an echinus bead on the Propyleion at Athens.

In the older temples, this uppermost delicate ornament is entirely wanting; the plain head-band usually abuts against the under surface of the cornice; therefore narrow fillets are often inserted between the head-band and the surfaces of the channels, as in Selinus and Paestum, or half-round beads, as on the second Temple in Selinus, which moreover only extends on the front surfaces. In Paestum and Selinus, the channels terminate in pointed or ogee arched forms without undercutting, or they are furnished with cushion-like undercuttings; others terminate in form of segmental, oval, or even semicircular arches, as in Akrai, the end being even bordered and characterized by palm ornaments; still others terminate horizontally in a dry manner, and instead of an undercutting, have an ineffective sloping triangular channel surface. On one Temple in Selinus, the surfaces between the

channels are also moulded, being rounded and bordered by two fillets (Fig. 88 b); the channels are bordered on the terra cottas of Akrai. Other fragments from Akrai and a painted frieze from a tomb at Cyrene show the head-bands of metopes and triglyphs worked in a common plane, -- examples from an early time, where a structural idea is not anywhere expressed in the construction of the frieze. Triglyphs in Eleusis, which belong to the latest period, also in a very peculiar way exhibit emblems on their front surfaces, besides the channels (See the adjacent colored Plate).

The triglyphs on the second Temple in Metapont are 2.2 ft. wide, are peculiar, and mere fragments of them have been preserved. The channels are composed of two quadrants, separated from each other by a groove at the back; the spaces between them are 3.61 ins. wide and are made concave with a fillet .56 in. wide at the middle (Fig. 89).

As the very numerous vestiges on limestone triglyphs coated with stucco and on those of marble still show, the entire surfaces were covered by a rich blue, only the head-band receiving an additional ornamented design, rings connected by oblique lines, as in Akrai, or perhaps also an ascending anthemion ornament. On the monuments decorated by sculptured metopes, the triglyph blocks received rectangular grooves on both sides for inserting the sculptured slabs, and to afford these the necessary support; on other monuments, where this was not the case, they are wrought on the same blocks as the metopes, or even two of them and three metopes are in one piece, as is the case in the Propyleion in Athens, which comes from the best period, and in other places.

On the Temple of Demeter in Paestum, the plain metopes form a continuous slab in which the triglyphs are inserted (Fig. 90).

The latter were chiefly held in place by the projecting covering cornice; this has now entirely fallen, and the triglyphs were compelled to follow it, not being fixed. Only the recesses which they formerly occupied are now to be seen in the great metope slabs.

81. Metopes.

On the Temple with the ancient sculptures in Selinus, the spaces between the triglyphs are first formed in shallow recesses, enclosed by a sill resting on the architrave, by two narrow jambs

and a lintel slightly projecting beyond them; the rear surface is formed by a plain vertical slab from which rise sculptures executed in high relief representing the deeds of Hercules, of Perseus, etc. (Fig. 91).

The treatment of the metopes on other monuments differs from this. They usually consist of a slab decorated by sculptures, or a plain inserted block, which might be decorated by painted ornaments, as shown by Fig. 88; the slab is ornamented at top by a narrow border, which consists of a simple band, (Compare most Sicilian temples, the Theseion, etc.) or of a band with a crowning beaded astragal (Compare the Parthenon), or of a band with an echinus moulding (Compare Propyleion at Athens), or is replaced by a group of mouldings (as at Phigaleia, Fig. 91).

Color was further added here as an enrichment, since the figures gleamed with the vivid colors of life and stood out from a dark or light ground; the head-bands were also decorated by a fret pattern or by a border ornament.

The construction of the metopes with thin slabs, as on the Parthenon and Theseion, must then have only occurred when they were intended to receive sculptured figure ornamentation. Simple and practical reasons favor such a procedure; these thin slabs were more convenient for the sculptur; he could master his problem with greater freedom from care, and the danger of injury to the sculptures by the stone-cutter and to the architectural portions by the sculptur were best avoided, because in this way, none of the work of one came into the hands of the other, and both were not compelled to work together or successively on the same block of marble.

The slabs with figure ornamentation are more frequently composed of two materials; thus for example, on the beautiful metopes of a Temple in Selinus preserved in the Museum at Palermo, which belong to the best period, the naked portions of the figures, such as the face, hands, arms and feet, are of white marble, while the bodies of the figures and the draperies are composed of the ordinary porous limestone, of the same piece with the slab itself, and were once coated with stucco and color.

On the fragment of a frieze in Epidauros, the triglyph and two metopes are cut in one piece, the latter being decorated by a rosette in relief (Fig. 92). Similar ornaments were also found in Eleusis, and on the Temple of Zeus in Olympia the met-

metopes were ornamented by round metal shields.

The plain metopes are mostly constructed of blocks, which extend more than half the thickness of the architrave and are sometimes arranged to abut between the triglyphs, or the triglyphs overlap a little to conceal the joint. (Compare the construction of Sicilian temples). The surfaces of the metopes always lie somewhat behind the front surface of the architrave.

/2/. The treatment of the triglyphs and metopes is therefore shown to be as diverse on the different monuments, as is the mode of construction of the entire frieze.

82. Inner Surface of the Frieze.

As little as the architrave exhibited the same treatment of forms on the side turned towards the cella wall, as that on the surface turned towards the person looking at the sanctuary, just as little do we find in case of the frieze the same treatment inside and outside.

The division of the frieze into triglyphs and metopes is omitted on the inner side. Above the architrave, either in the same plane with it or set somewhat behind this (as on the Parthenon), rises a plain continuous frieze crowned by special mouldings on which first rests the ceiling of the portico. these plain inner frieze-beams often occupy half the thickness of the frieze, or if sculptured metopes are intended, something more than one-third of it. In monuments constructed of limestone, as in Sicily, on Egina, and in Phigaleia, the separate portions of the frieze mostly touch inside, while on the Parthenon, interspaces of 7.87 to 9.84 insa lie between them; the blocks are then held together by iron I-cramos set in cast lead; just behind the sculptured metope slabs are rough blocks as large as the triglyphs and connected with them by one or two I-cramps of iron; the blocks are vertically connected with the architrave and the crowning cornice by iron dowells. The same solid and careful mode of construction, as in the masonry of the cell, is also shown between the parts of the cornice. The front, inner and outer surfaces of the frieze are not vertical in the Parthenon, but are likewise built inclined, following the inclination of the columns and cella walls; the entire surface of the entablature from the lower edge of the architrave to the projecting cornice therefore lies in an inclined plane.

The projecting cornice slabs then most commonly bind together all the stones belonging to the frieze and rest upon them. They are composed of proportionally narrow through blocks, which are usually somewhat wider than the triglyphs and narrower than the metopes (Compare Fig. 93, also Eggesta, etc.), and both rest on the metope blocks and also on the triglyphs. Hence the repeatedly stated law, "that the metopes never were supporting members, and that the burden of the cornice-margin of the roof was borne by the triglyphs alone, which originally received the ceiling beams behind them", is not demonstrated by the construction of a single monument.

/22. The different treatment of the frieze on its two sides already does not permit the idea of considering the triglyphs as supports and the metopes as openings to prevail; the assumption that the weight of the cornice was transmitted through the triglyphs to certain points of the architrave is also found incorrect. In most of the executed constructions described, the loading of the architrave is nearly uniform. If the triglyph-pillars were intended as supports, they should at least be so wrought as to extend through the entire depth of the frieze. If the metopes contribute to lighten the load of the architrave, then the spaces between the triglyphs should only be closed by thin slabs, both outside and inside; the intervening space should be void; the cornice slab should only touch the triglyphs, and ought therefore to extend over one-half or the entire length of the architrave. But these requirements are nowhere satisfied.

Notwithstanding this, if one desires to retain his belief in an originally structural significance of the triglyphs and metopes, he must admit that in the best period of Grecian architecture and even two centuries earlier, the understanding of this idea had already become extinct.

In regard to the treatment of the cella wall, it has already been intimated, that at the ends of a few monuments occurs a transference of the triglyph-frieze to this wall; yet this only takes place where the opening of the doorway in the end wall is enlarged to a colonnade-in-antis.

The Temple in Phigaleia, the three Temples E, D and S at Selinus, as well as the Temple of Zeus in Olympia, had this transferred triglyph-frieze (the latter over the antae-arrangement

of the pronaos and posticum), but it always ended with a peculiar return at the angle and never was continued along the sides or above the solid wall of the cella (Fig. 94). The Temple S had a second colonnade; the architrave belonging to this was /123 continued above it to the architrave of the external colonnade, and consequently the inner triglyph-frieze over this entirely disappeared, an end triglyph abutting against the plain inner frieze of the peristyle.

The circumstance must always remain singular, that the continuance of the triglyph-frieze along the solid walls of the cella was always avoided. If the cella not surrounded by columns was the most ancient form of temple, and if the metopes were window openings for lighting the interior, some reminiscences of such an arrangement must have been found on the side walls of the cella in the earliest examples. But such are nowhere met with, while even in the little so-called antae-temples, the triglyph-frieze on the pediment ends is generally omitted on the sides. The passage in Euripides, which had moreover to be rejected on philological grounds, therefore loses all importance, even if one supplies "between the triglyphs". Were openings assumed, no one could reach the interior of the cella by getting in through the triglyphs, either in case of a peripteral or of an antae-temple. Only on sepulchral monuments or on secular structures, as on the Athenian Propyleion, do triglyphs occur above a solid wall.

83. Other Forms of Frieze.

But the triglyph-frieze is also omitted above the architraves of the pronaos and posticum, giving place to a perfectly plain frieze, as on the Temple at Egina, or the divisions between the figure reliefs disappear and a continuous composition occurs in place of the small separate scenes, as on the Theseion in Athens (Fig. 95), and in the most perfect manner on the Parthenon (Fig. 94). The same case is found in the posticum of the former as on Temple S in Selinus, the architrave and the frieze extending from one side colonnade to the other, while in the pronaos, the frieze only extends across the width of the cella and terminates at the sides in a plain return. The figure frieze on the Parthenon, which occurs in place of the triglyphs, extends around the entire cella structure. On the

Temple on Egina, the regulas and drops suspended beneath the plain and figure frieze recall the triglyphs, which could not be employed in the great figure composition of Phidias. a more correct feeling omits the regulas and drops beneath the figure frieze on the Theseion; the plain architrave band gives place to a richly moulded border, composed of fillet, ogee and half-round.

The separated and different frieze decorations on the Parthenon and Theseion are found on the Doric Treasury of the Megareans in Olympia combined in the same surrounding frieze: the triglyph-frieze alternates in this with continuous figure compositions, so that the former decorates the ends, and the adjacent sides are ornamented by the latter.

The figures of the continuous frieze were also colored, as well as those of the metopes on the colored Plate, ⁸¹ opposite p. 118, which indeed rose from a dark back-ground.

Note 81. On the reliefs of the Macedonian royal sarcophagus in the Museum at Constantinople, the ground from which the colored reliefs rose, remained white.

Without reference to their elevated position and the location of the observer, the small figures of the frieze and metopes were designed and executed as if for direct view. The figures of the metopes of the Parthenon average 3.28 ft. in height and require the observer to be at least 50 ft. distant from the building in order to see the entire back-ground; a line of sight of at least 70 ft. being thus conjectured. The figures of the frieze of the cella are about 2.72 ft. high, and they may either (certainly with considerable foreshortening) be seen from the uppermost step of the stylobate, the line of sight then making an angle of 60° with a horizontal at the side of the cella and having a length of 40 ft.; the greatest distance from the building that can be assumed and also at its side, without some portion of the frieze being concealed by the lower edge of the architrave, gives an angle of 40° between the line of sight and a horizontal with a length of 75 ft. for the visual ray.

84. Subdivision of the Frieze.

The distribution of the triglyphs on the frieze is then such that one comes above each column and one over each interval,

the centres of the columns and triglyphs coinciding in one case and those of the interspaces and triglyphs in the other; an exception is only made in case of the angle column, since a triglyph always forms the angle of the frieze. The triglyphs and metopes usually have equal widths among themselves; if these are to be retained and carried out in the frieze, the mode of arranging the columns will necessarily depend on the subdivision of the frieze. Under this assumption and with the use of an angle triglyph, there must be a smaller interval between the angle and second columns, than between the second and third or third and fourth (Fig. 96).

125 If the unequal intervals between the columns resulting there-
126 from are to be avoided, only two methods exist; to make the metopes next the angle, or these and the next succeeding ones, wider than the others, or to give up the angle triglyph, the latter being usually preferred in Roman art and in that of the Renaissance, in order to make equal distances of the columns from each other possible and to produce no disturbance in the frieze.

On Sicilian monuments, as already mentioned, where the intercolumniations are all different, i.e., increase towards the centre, it is self-evident that the metopes are likewise of different sizes; differences in dimensions also occur at the Parthenon, produced by inaccuracies in the arrangement of the columns and in the execution; for the same reason, the regulae and drops are not always exactly beneath the triglyphs. For example, the the second on the eastern side, counting from the south-east angle, is displaced about $5/32$ in. These petty irregularities in the Attic masterpiece must not be confounded with the intentional ones on Sicilian monuments.

Three solutions are then possible in the treatment of the frieze:-

1. Metopes and triglyphs equal among themselves, using the angle triglyph, then unequal intercolumniations.
2. Triglyphs equal, but metopes nearest the angle larger, retaining the angle triglyph, then with equal intercolumniations.
3. Metopes and triglyphs each equal among themselves, with equal intercolumniations, the angle triglyph then given up, a half metope being employed at the angle.

The last solution is not carried out on any Grecian monument; it was indeed assumed for the Temple of Demeter in Paestum by

Delagardette; but I may doubt its correctness.

Vitruvius terms the solution defective "whether made by lengthening the metopes or reducing the intercolumniations", and it results from this that the ancients had in the course of time avoided the use of the Doric order in their temples. With the abundance of Doric monuments, which originated in the best period and were still built until the period of decline, this principle of Vitruvius appears somewhat singular; Vitruvius indeed quotes the evidence of some ancient architects, of Tarchesios (otherwise unknown), of Pythios (builder of the Temple of Athene of Priene), and of Hermogenes (builder of the Temple of Artemis of Magnesia), as saying that on account of the defective and inharmonious proportions of the members, no more great temples of the Doric order should be built.

The normal distribution of the triglyphs shown as being usual for Grecian Doric temples with closely set columns, Vitruvius designates as "monotriglyphic", i.e., with one triglyph above each intercolumniation (Book IV, Chap.3), in contrast to those with two or three triglyphs for each intercolumniation of buildings with widely spaced columns (Compare the central passage of the Propyleion, and that of the Market Gate at Athens).

Since the marks of the derivation of the triglyph frieze on existing stone monuments from any other mode of construction were lost in consequence of the change of the ceiling of the portico, and the frieze thereby became already in the earliest period of the stone temple merely an ornamental accessory, there remains for its explanation only the assumption, that historical traditions and recollections of an architecture, that disappeared long since, may be preserved in it, for otherwise its function in the building cannot be explained. ⁸²

Note 82. Finally, how little the original connection between the structural and ornamental form of the Doric frieze may be understood is proved by the arrangement of the triglyph-frieze on the Arsenal of Philo, with which are then contrasted the two story Stoas in Athens and Pergamon.

If we adhere to the wooden theory, then according to what has been already stated, Dieulafoy (p. 66) in stating that the triglyphs are wider or enlarged dentils (these being explained as the ends of beams, as visible on Lycian rock-cut tombs),

whose dimensions were fixed by the size of the transverse beams, which again depended upon the weight of the roof and of the covering material. The triglyph frieze is then the changed form of the dentils (See Goller, p.78), and the use of the one decoration excludes that of the other on the same building. And yet we find SCompare Figs. 5,6) a triglyph frieze and dentils above each other on truly ancient *terra cottas* from lower Italy and Sicily! The late period indeed does the same (Compare Pergamon and other places); still we ought not to take this into account.

In explanation of the triglyph frieze, Vitruvius (Chap. II-4) says:- "if one be of the opinion that where triglyphs are now found, there were openings for light, one should for the same reasons believe also that the dentils in Ionic buildings have taken the place of windows. For the intervals on both sides, both between the dentils and also between the triglyphs, were termed "metopes"; for the Greeks call the places of beams and poles "opai", as our countrymen call these holes "dove-holes" (columbaria). Thus the intervals between beams, which are found between two of their positions (opai) is termed "metope" by them.

Hence the opai are holes in the masonry for beams, or in modern language, "holes for through beams", but in wooden construction are the places at which the ceiling beams rest on the architrave.

128. Therefore in one case the metope is a piece of masonry between two holes for beams, and in the other it is the open space between two ends of beams, to be filled later, but neither in the completed stone or wooden framed construction is it a hole or a small window.

According to the usage of the Grecian language, the word "metopon" denotes the part over the root of the nose and between the eyes, thus a solid body, a division between two openings. It is used in this sense in the building contract for the Arsenal near Zea⁸⁵ (contract of Enthydomos, son of Demetrios of Miletus, and of Philon, son of Exekestes of Eleusis, for the erection of an arsenal near Zea) for there "metopon" signifies a strong pier or door-jamb, especially the mullion at the centre of a double doorway, a division between two openings.

Note 85. Corpus Inscr. Att. II; 2, No. 1054, lines 22-26. Berl.

The passage in question runs thus in the original (See Durm). Two translations or interpretations of this lie before us, one by Choisy⁸⁶, and the other by Bohn⁸⁷.

Note 86. Choisy, 'A. Etudes sur l'Architecture grecque. Ire Etude; L'Arsenal du Pirée. Paris 1888. Also Fabricius in Hermes 1882, p. 570.

Note 87. In Centralblatt d. Bauverw. 1882. p. 296.

From Choisy... "reserving on the width of the arsenal doors to the number of two on each side; width nine ft. And on each side between the two doors, build a dividing mullion having a width of two ft. and set ten ft. toward the interior. And carry to the first pillars the wall, against which opens each of the two doors".

From Bohn.... "but openings for doors at the ends are to be left, two of those at each end, nine ft. wide. But on both sides shall a space (metopon) be arranged between the doors (their walls?) two ft. wide, but to project inward ten ft., the wall shall bend around to the first columns, and also each one of the leaves of the doors to open against it".

Choisy's interpretation is correct and that of Bohn is not; the point will become most easily understood by the sketch in Fig. 97 according to Choisy's view, who should have more properly used the word "ouvertures" (openings of the doorways) instead of "portes". "Duraías" (openings for doors) seems to have been intentionally written the first time, and "duron" (doors) the second time. For only by means of the end wall inserted at the centre,-- the metopon-- were there two doors!

As in Vitruvius the metope is the piece of masonry between the holes for two beams, so is it also with the Athenians the strong dividing and supporting pillar between two openings for doors, and if Vitruvius excludes the assumption that the triglyphs were windows, according to him and to the preceding Grecian building contract, the metopes were still less window openings! Triglyphs are indeed mentioned twice in the contract of Philo;⁸⁸ but they are never opposed to metopes.

Note 88. "Metope" otherwise briefly signifies "face" or "front". "Metopon" and "metopou" are to be understood in this sense in the building contract for the Athenian Walls. (Corp. Inscr. Att. II, Berlin 1877, no. 167, lines 40, 66) There simply means "front".

In the building inscription of the Asklepeion ⁸⁹ the structural parts above the columns do not receive the names otherwise current, but:--

129. The architrave is designated by "to stroma".

The frieze by "poistasis" (what sits on the architrave).

The cornice with the stroteras and calymmatias by "stora".

Note 89. See Baunack, J. *Aus Epidauros. Eine Epigraphische Studie.* Leipzig. 1890.

85. Terra Cotta Facings of Wooden Beams and of Stone Structural Members.

"Mortar and terra cotta", Semper writes, ⁹⁰ are both very ancient traditional covering materials; of these, mortar was more frequently employed as a covering for masonry, terra cotta, chiefly as a covering for woodwork. Both the external wooden beams and also the internal ceiling were in the archaic temples entirely covered by richly ornamented terra cotta plates". Semper further states that the museums of Sicily and lower Italy (Palermo, Syracuse, Castelvetro, Metapont, Naples, etc.) are rich in terra cottas of this kind, and he gives three different examples of these as evidence.

Note 90. In *Der Stil etc. Band I. Frankfurt a M. u. Munich.* pp. 446, Taf. 3.

Others had already been earlier taken from the ruins of Metapont (1833) by the Duc de Luynes and by Debaco and published; Le Bas ⁹¹ added further materials; Hittorf repeated and increased this in his great work "Restitution du Temple d'Empedocle a Selinonte, ou l'architecture polychrome chez les Grecs (Paris, 1851. Pl. 10, Figs. 4, 5, 6), adding especially in Fig. 5 "serving as a covering for wooden beams". Viollet-le-Duc also assumes wooden beams covered with terra cotta in his plates on antique architecture.

Note 91. *Voyage archaologique etc. Paris. 1847-77. Unfin.*

To the terra cottas of the Great Temple in Selinus published by Hittorf, others were added in the seventies, which were photographed and made known by Fiorelli in July 1876 in *Bulletino, Notizie degli Scavi di antichita comunicata alla R. Academia dei Lincei di Roma*; other fragments were found in the winters of 1876 and 1877 and were placed in the Museum at Palermo.

To these were then added the finds in Olympia, which afforded

new points of view in regard to the use of such terra cottas. The finds made at the Treasury of the Gelonas permit the assumption that the terra cottas were likewise employed for the decoration and for the protection of stone members. There is nothing surprising in this, if as particularly occurred in Sicily, the inferior and porous limestone were covered by a firm facing and terra cotta was preferred to stucco on exposed surfaces, or that the burnt-in painting on terra cotta was preferred to the perishable kind laid on stucco.

The mode of fastening these coverings, these terra cottas chiefly made in box form, to wood-work is made clear by the pieces in Metapont. The terra-cotta boxes 13.2 ins. high with reliefs and painted, which were in great part preserved there, exhibit square holes in their sides, through which copper (not bronze) nails were driven into the wood-work to be covered. Abruptly curved copper nails still remain in part in these holes. A great number of these, which accurately fit in the holes, are kept in the glass cases of the so-called Museum in Metapont; they all measure 5.1 ins. in length, are square and have square heads. The metal, form and size of the nails leave the former fastening in the wood without doubt; likewise the fact that the terra-cottas nowhere show vestiges of mortar on their backs, but only the clean surface of clay, permits the conclusion that these could only have been used on wood.

Fragments from Syracuse and Selinus exhibit similar arrangements for fastening and the same lack of marks of mortar.

Since some pieces are entirely flat and have no added mouldings, they may have been flat middle pieces between two box pieces. But others again show mouldings and conical or cylindrical holes on both the painted and unpainted flanges (See Fig. 98 as well as the succeeding volume of this Handbuch, p. 161-162).

12). Principal Cornice.

86. Form in General.

The main cornice (crowning cornice, geison, corona) expresses the burden of the roof, crowns the building, and is the protection and shelter of its enclosing walls from injuries by weather. The gutters along the sides for collecting water (which are moreover not constructed on all monuments), the coronas and cymas that extend up the pediment, are borne by it and both crown the

cornice and the entire building in the most beautiful way.

87. Cornice Slab.

The crowning cornice first consists of narrow slabs of rectangular section arranged beside each other, which project far beyond the triglyph frieze and almost entirely cover its width, therefore terminating and affording protection to it. The front slab is usually crowned at top by an ogee moulding on which are painted or sculptured broadly lobed, recurved leaves; the upper part is sometimes wrought on the same block as the geison, sometimes on another one laid on this. A small and deeply undercut flat surface is visible beneath (fillet with water drip), always made prominent by strong color, from which the lower surface of the slab is obliquely cut away back to the front surface of the frieze, thus lessening the weight of the projecting portion and preventing the rain water from running back. The inclined surface generally abuts against a vertical one (Compare Parthenon, Theseion, Temples in Selinus, Phigaleia and on Egina) by undercutting the projecting slab, which projects but little beyond the head-band of the triglyphs. This slab is also reduced in height in some monuments, then terminating against the triglyphs in ogee form (Compare Propyleion in Athens, and Fragments from the Barbakeion there and in the Museum at Palermo).

88. Mutules.

Corresponding to the triglyphs and metopes and of equal width with the former, rectangular cut blocks (Mutules or Viae) conceal the inclined surface of the geison, are separated by incisions, and are ornamented by cylindrical or conical pins (Drops or Guttae), 3 rows in depth and 6 in length (making 18 in all. These mutules end abruptly against the vertical surface (Parthenon, etc.), or are connected together at the back by narrow borders (Propyleion in Athens), or they are wrought entirely free and isolated by incisions, lying beside each other on the inclined surface (Compare Fragments from Athens).

The middle of each mutule coincides with the centre of a triglyph or metope. Since the mutules are of equal width on most monuments, though the metopes are wider than the triglyphs, the width of the separating incisions depends on the difference between the widths of the metopes and triglyphs. On older temples, for example on the one in Selinus with the archaistic figure

decoration, the mutules above the metopes have merely half the width of the triglyphs and support only 9 drops. (Fig. 99).

The different parts of the lower surface of the cornice, such as mutules, drops, and incisions, were painted in strong, unbroken colors, which clearly distinguish them from each other at a considerable distance. The mutules were of the same blue as the triglyphs, and the separating incisions were a full red; the drops may have been gilded. The surfaces of the incisions on the Propyleion at Athens still show painted plant ornaments (Penrose has even drawn vestiges of them); the same are also found on the Asklepion in Epidauros⁹²; the large inclined surfaces found at the angles probably had painted or sculptured anthemion ornaments. At the completion, drops that were broken off were again set in lead; others were previously fitted in drilled holes. On one of the Treasuries in Olympia, square holes were first cut in the surface of the mutules and square pegs were fixed in them by lead pins, the drops being then cut on them. The patching of a portion of the cornice in limestone in Athens is interesting, where the broken off fragment is held in place by an inserted double-dovetail piece of stone, - still movable! (See Fig. 62).

Note 92. See Praktika. Jahrs. d. Arch. Ges. in Athen. 1885.

On the Parthenon, the free portion of the vertical band against which the mutules abut was covered by a fret pattern; the ogee moulding found in place of this on the Propyleion was painted with a heart-leaf ornament, whose vestiges are still plainly visible. The narrow though long cornice-slabs, in order to make the closest possible fit and joint, touch each other on their abutting surfaces on margins 1.97 to 3.94 ins. wide, which are most carefully wrought, while the middle surface is sunken lower. They were connected with the divisions of the frieze lying beneath them by iron pins and with each other by the well known iron I-cramps. The drops of the mutules are usually wrought out of the same piece with them, though also exceptionally inserted separately (Fig. 99).

One peculiarity is still to be mentioned. At the points where the Guard-Hall and the Pinacothek join the central building of the Propyleion in Athens, the mutules on the horizontal cornice are wanting. The regulas and drops of the triglyph above the

antae standing next the middle structure are still preserved; the triglyph itself is no longer in existence. The head-band of the architrave and of the triglyph is extended along above the plain wall surfaces, the still preserved cornice above it consisting of a deeply undercut geison, crowned at top by a small moulding, which passes into the vertical wall by means of an ogee form, and returning at a right angle, runs to the side wall of the central building (Fig. 99). The present condition of the monument and the absence of the part of the cornice at the point in question does not permit one to ascertain now in what way the transition was made from one building to the other.

The mutules are accordingly omitted on the inclined under surface of the geison, whenever this extends along above a plain frieze; they must also disappear from the pediment geison, which extended above the plain geison.

As a matter of fact, no Grecian monument exhibits mutules on the under surface of the pediment cornice slabs: these rather consist of a plain band on their front surfaces with an ogee moulding, as if crowned with recurved broad lobed leaves. the front surface of the pediment geison being in the same plane with the horizontal main cornice geison.

The pediment geison is strongly undercut, terminating in a slightly curved form at the front edge of the geison and ending against the pediment wall with a bold ogee moulding. Like the horizontal cornice, this is composed of proportionally narrow blocks extending across the entire pediment wall and fastened together by iron pins.

The starting blocks of the pediment cornices on the Parthenon and Theseion are wrought from a single massive block of marble together with the horizontal cornice, and which rests on the angle triglyph and the two adjacent metopes; it does not abut against the adjacent parts over the second triglyph from the angle, but over the metope itself.

On the Propyleion, a portion of the cyma is wrought from the same block as the starting stone of the pediment cornice, thus forming the heavy angle stone of the pediment, which rests on the slab-like angle block of the horizontal cornice.

The apex of the cornice is cut as a horizontally bedded block

of stone resting on the pediment wall, and whose inclined joint surfaces are made at right angles to the inclination of the pediment. (Compare Theseion and Temple in Akragas).

89. Cyma.

Resting on the pediment cornice rises the crowning moulding for collecting and carrying off the water, the cyma in form of a flat echinus moulding bordered above and beneath by fillets (Parthenon, Propyleion), of an ogee or reverse ogee moulding (Phigaleia, Egina), or rising as a flat surface (Athens, Selinus), decorated by aspiring anthemion ornaments (Parthenon, Egina, Phigaleia), or palm-leaves directed upwards and downwards (Fragments in Athens). Generally arranged at right angles to the inclination of the pediment, this ornament was sculptured on the cyma (as in Phigaleia), or merely painted (as on the Parthenon and on Egina); on the Propyleion, the intervals between the pointed and ovate leaves were sunk deeper, the form of the leaf being outlined with the point tool, and the edges and surfaces of the leaves were painted.

The gutter cymas on most Attic Doric monuments were only carried along the pediment and were therefore omitted on the sides, where they are returned but a short distance, and they always ended in right section concealed by a lion's head (Compare Parthenon, Theseion, Temples in Phigaleia and on Egina, also Temple A in Selinus).

The cyma was cut in the marble or executed in terra-cotta, and it consisted of pieces of moderate length, which concealed half the depth of the cornice slab and were joined together at their ends by a peculiar water-tight rebate. (Fig. 100).

The rain water falls to the ground along the sides over the edge of the cornice without obstruction or being previously collected, the gutter cyma of the pediment merely prevents the water from running over in front, and chiefly gives to the cornice the expressive and rich termination, forming the crowning frontlet, the ornamental diadem of the beautifully treated sanctuary. (Fig. 100).

Temples B and S in Selinus carry the cyma along their sides also; they are then decorated by projecting lion's heads at fixed intervals, from whose open mouths the rain water falls to the ground. Simple conical tubes are carved in marble and

also perform this service in a less ornamental manner. (Compare cymas from Athens and other places as in Figs. 102, 103).

Vitruvius requires these lion's heads to be first placed above each column, the others being similarly arranged to correspond to the centres of the roofing tiles. The first are to be perforated like spouts, the others being solid, so that the water may not descend in streams between the columns and fall on persons passing between them. In case of strong winds or storms, the intercolumniations would not be free from water, even were it only discharged in front of the columns.

The principal use of the lion's heads on the cymas of Grecian buildings as water-spouts (hydrorrhoea) is indeed to be ascribed to Egyptian precedents. When the sun entered the constellation of the Lion, the annual fertilizing overflow of the waters of the Nile commenced; all fountains architecturally treated by the Egyptians flowed from the mouths of lions; among the Greeks, the lion had the symbolical signification of protector of fountains; also with them, the sacred water gushed from the mouths of lions. These lion masks must have been first used by the Corinthian sculptor Dibutades as hydrorrhoeas on the gutters of the roof.

The cyma and the additional small mouldings shone with rich decorations in colors, as still shown by the Sicilian remains, the added lion's heads being very strongly colored or entirely gilded.

90. Historical Form.

If we search for the historical form of the main cornice,--the same is true as for the triglyph frieze, --we must again return to the wooden huts of Asia Minor.

139. Above the closely set round wooden timbers, which were later made square in section and spaced somewhat apart, but were always small, lies a high wooden construction, which extends around the building and serves to prevent the material of the horizontal or convex terrace roof from sliding off. This structure beneath the low domed clay roof was covered by ornaments and is again found in the architecture of the Francois vase.

If the interpretation of the very defective inscription in reference to the rebuilding of the city walls of Athens by Choisy⁹⁴ be correct, a longitudinal timber (N) of fixed height



was required above and along the ceiling beams projecting beyond the face of the wall, which, after the slope of the roof had been formed, had to prevent the slipping of the pise piled up in form of a gable roof or of unburnt bricks (M, Fig. 104). The gable roof of pise occurs here instead of the flat or low domed clay roof, while the precautions against sliding of the mass of earth remain the same.

If in this construction of the last years of the 4th century B. C. (306 - 303) an ancient construction of the cornice is imitated, and it has not rather resulted from the peculiar purpose of the building, the ground form of the translation into stone would be found, although not for decoration, for which all data are lacking.

Note 93. Discovered 1829. See: - Bullet. d. Inst. Archaeol. March 1835; also see Müller, C.O. De Munimentis Athenarum etc. Göttingen. 1836.

Note 94. In Etudes epigraphiques sur l'Architecture Grecque. I etude; Les murs d'Athenes d'apres le devis de leur restauration. Paris. 1888. Sect. 60-65.

The angle block of the cornice of the Treasury of the Megareans in Olympia (Fig. 105) shows us how the basal form is to be kept separate from the ornamental form. For the use of the often very rich and beautifully decorated front protecting tiles as facings for ends of ceiling beams affords additional information in reference to the description of the work for the Athenian walls, which is also stated in the succeeding volume of this Handbuch (Fig. 183, p. 207).

But if we assume the roof with rafters to be a later advance, instead of the clay roof, then must the ground form of the latter stone cornice be derived from the combination of beams and pairs of rafters, as indicated by the Temple of Concordia in Akragas in Fig. 105 (Also see the volume just referred to, Fig. 184, p. 208). Then the front surface of the geison may be regarded as corresponding to the continuous face-board of the ends of the rafters (with or without a terra-cotta covering of the board), the mutules or viae to the undersides of the projecting rafters, inserted and ornamented small boards, and the narrow vertical band, to the continuous covering strip, that projected the cut-off ends of the beams.

91. Terra-cotta Facing.

The terra-cotta facing and the arrangements for fastening it to the timbers of the roof and ceiling are verified by finds of such objects and by evidence of the building contract for the city walls of Athens⁹⁵.

Note 95. Compare:- Die Funde von Olympia. Edit. in one vol. etc./p.36 - 38, Taf. 38 + 40. Berlin. 1882. Also 41 Programm zum Winckelmannsfeste d. Arch. Gesell. z.Berlin. 1881. The decision of Fenger (Dorische Polychromie etc., p. 19. Berlin. 1886) in reference to covered woodwork has meanwhile been corrected to accord with the facts. His rather perplexing text appears to substantially repeat the views of German masters, gratitude to them being expressed in a preface. On account of the copper nails in Metapont, the law (in 41 Programm z.Winckelmannsfeste d. Arch. Ges. z.Berlin, p.11, Berlin, 1881) that the terra-cotta boxes are to be regarded as facing pieces for the geison, is no longer tenable.

Similar terra-cottas, as we have shown them in Metapont, Syracuse and elsewhere, were also certainly employed in Olympia; but judging from the stone cornices remaining, they were fixed on these and not on woodwork.

In the ruins of the Treasury of the Geloeans were found fragments of the geison of shell conglomerate, which had a groove set back on the top and iron pins in the front surface. The block examined at the locality by me (1890) still retained projecting iron pins at distances of 7.1 and 15.7 ins., slightly projecting from the surface and occupying the middle of the front side. The inclined under surface of the stone was covered by thin red stucco. In the "41 Programm zum Winckelmannsfeste der Archaeologischen Gesellschaft zu Berlin" iron pins are mentioned, but on the front and upper surfaces of the stone.

Bronze pins were found in the ashlar supporting the rafters of Temple C in Selinus after the discoveries in Olympia. According to my sketches made in March 1884, these ashlar have a length of 3.94 to 6.09 ft., a width averaging 2.89 ft., and a thickness of 1.57 ft. and over, according to whether the upper surface is dressed off more or less roughly. A border on this is cut better for 10.2 to 18.9 ins. from the front face, and the front surface is more carefully dressed. The border is

sunk .20 to .79 inch. Bronze and iron pins remain in this at distances of 7.28 to 7.88 ins. from the front edge. Not all of the existing blocks have at this time these pins (five belonging to the north side and one block of the south side, fallen into the cella). Many are free of them and bear no mark of anything of the kind. Angle blocks were not preserved; even the /4/ pediment geison has disappeared. Some of the pins are at the junction of the border and the rough upper surface; the distances between the pins and pin-holes do not correspond with the notches for the rafters, and are also not repeated at regular distances (Fig. 107).

These arrangements on the cornice stones are rightly referred to facings of another material, and such facings of painted terra-cotta were first found in Olympia and made credible by Dörpfeld and his associates. The box-shaped facings found by them and their fastenings must have accurately fitted the iron pins in the stone in regard to dimensions and distances.

The terra-cottas found at the Temple C in Selinus and exhibited in 1884 in the Museum at Palermo show no nail holes in the unpainted flange; all these were rather found in the painted front surface with the head-band, and in none is the latter sufficiently preserved that its ending may be given with certainty. But this does not exclude that other pieces with other peculiarities existed or now exist there or at other places.

After the descriptions and discussions, one can no longer doubt the use of terra-cotta on stone⁹⁶.

Note 96. See on the other hand Hauser's Conference on the 41 Programm zum Winckelmannsfeste der Arch. Ges. zu Berlin. Berlin. 1881.

Scarcely any different impression exists concerning the use and arrangement of painted terra-cotta cymations with the noteworthy heights of 1.64 ft. and over. They were employed in Selinus, Syracuse, Gela, Metapont, Olympia, etc., and they extend along the pediment cornice as a crowning member and along the sides of the temple as a great gutter for water, as already shown by Hittorf. These must in time have given way to those of hard, fine-grained limestone, as shown by examples from Selinus, Mimera, and Akragas, whose heights then increased to from 2.46

to 2.63 or even 2.69 ft.

In regard to profile, ornamentation and color, these limestone cymatiums are faithful copies of the older terra-cotta cymatiums; they also exhibit to us the mode of connection with the roof tiles and the careful end jointing of the pieces by overlapping grooves, the addition of small metal cramps and the introduction of grout mortar, as well as the covering of /42 the side joints by hollow tiles, which extend nearly to the back side of the cymatium. The gutters, i.e., the width of the channel for water, remain relatively narrow, for they only measure 6.3 to 7.1 ins. in Himera and Akragas. The water¹⁷² was led from the collecting gutters through the so-called spouts, which were formed like projecting rectangular channels, as widely opened lion's jaws, or like trumpet mouths. These were evidently only required on the eaves. Tubular mouth-pieces for spouts have already long since been found on marble cymatiums in Athens, and similar ones of terra-cotta in Olympia and also by Cavallari in Selinus. The piece exhibits complete harmony with those found in Olympia, is preserved in the Museum in Palermo, and was published by Cavallari in 1882. (Scavi di Selinunte, eseguiti nell'anno 1882). A piece of a box in the Museum at Castelvetro exhibits the addition of such a mouth-piece to the front of a painted terra-cotta water gutter.

The water from two vertical rows of tiles (together 3.7 ft. wide) on the Temple in Himera was led to one spout, whose opening at the smallest section is 2.75 ins. high and 4.72 ins. wide. On the small Treasury of the Geloans, two spouts were assigned to a row of tiles 1.9 ft. wide, and whose circular sections are 1.57 ins. diameter. A cymatium, found in Akragas, exhibits an outlet opening 2.36 ins. high with a width of not even .79 in.; the tubes from Selinus have a diameter of 1.38 ins., and those on an Athenian cymatium are only .98 in., thus all have rather small sections. The number of spouts must increase the disadvantages by their small sections, and the cymatiums are 1.64 to 2.46 ft. high and prevent the water from running over.

The pieces of the cymatium also frequently had exactly the width of the gutter tiles, and their sides were bent up like those, which were covered as far as possible by cover tiles,

an arrangement that probably proved better, like all the ingenious detailed descriptions of the rebates on the high cymatiums, and which were also retained even in the latest period (Compare Pompeii), and even then received improvements. A spout was there for each row of tiles, so that the cymatium could be lower and the outlets remain small. The remains of cymatiums in Metapont belong to this class.

As before stated, the buildings of Pericles in Athens did not have gutters for water (cymatiums). The water fell freely from the lowest range of tiles, or in windy weather ran down over the face of the geison to its drip and then fell to the ground. Instead of the decorated cymatium along the long sides, we find the ornaments of the antefixas in use, sometimes ranging with the cover tiles, sometimes only placed as decorations. (Compare Parthenon). This was at all events the older arrangement; the termination of the lowest cover tile by a flat surface or an ornament placed before it is readily suggested, has a technical basis, and affords an effective ornamentation of the upper horizontal line without further trouble. But the combined or united antefixa ornament must be just as ancient, which is solid with the lowest flat tiles of the roof and conceals behind itself the cover tiles of the lowest range (See Fig.100).

The interlaced and painted terra-cotta anthemions, nominally found in greater number at Temple C in Selinus, stand on flat tiles with a front facing and curved edges at the sides, i.e., are one with them. Corresponding to the other flat tiles of the roof, they were 2.46 ft. wide and were indeed nailed on the rafters like gutter tiles. (Compare the Lex Puleolana, Corp.Lat. Insc.No.577, which requires the nailing of the lowest range of tiles). While the anthemions are mostly well preserved, the flat tile portion belonging to them only remain in short pieces about 698 ft. long. Their original form therefore cannot be entirely determined. The water from the roof surface escaped through places left open in the interlacings. The painting of the front facing of the anthemion gutter tiles clearly indicates their projection beyond the cornice members beneath, as this was everywhere usual with the ordinary gutter tiles. Nothing surprising can be found in the flowing of the water between the anthemions, since the same likewise occurred on the Athenian buildings, -

certainly with larger openings.

Moreover, Selinus does not stand as the only example of this. A fragment in the Museum at Metapont still more strikingly exhibits the projection of the gutter tile decorated by anthemions. The round on the under side is painted in a single color and acts as a water drip; the under side is painted for a width of 3.94 ins. and shows a broken place beyond this, and it is therefore not improbable that a vertical flange extended downwards there, as shown by another fragment of a painted tile preserved in Metapont, on which the projection for the anthemion exists, whose stem or base is decorated by an ornamental projecting lion's head. It may then be permissible to regard the piece in question as the gutter cornice tile of a projection with rafters, where the bases decorated in relief covered the front ends of the rafters, or the strip fastened before them. (Compare the succeeding volume of this Handbuch, Fig. 50, p57).

The ancient constructions of the roof, which are imitated on an Etruscan chest for ashes (Museum in Florence) and on Grecian reliefs (Museum in Naples), partly exhibit overhanging pairs of rafters. A painted fragment of a tile in the Museum at Syracuse also by its form admits of the conclusion of a similar purpose; only the anthemion is not set back there, but is in the same plane with the facing flange. Projections affording protection also appear on the known gutter tiles of Olympia with the undercutting like a water drip, and the gutter tile of Aegion published by Hittorf (Pl. 83). Other fine examples also lie on the Acropolis and in the Theatre of Dionysos at Athens, a representation of which is given in Fig. 108. An example of a gutter tile with "kalypt" and antefixa worked on it is found in Fig. 108, of the kind frequently found in Olympia, executed in larger and smaller dimensions. The older terra-cotta cymatium pieces (Treasury of the Gelons; Syracuse) mostly exhibit the form of the Egyptian cavetto cornice, while another (indeed later) group has flat surfaces with a cymatium moulding at top. ¹⁰⁰

Note 100. See Puchstein, pp. 52, 53.

Pieces have also recently been found by the excavations in Pompeii, which are similar to those described. ^{101.}

Note 101. See Duhn, F.v. and Jacobi, L. Der Griechische Tempel in Pompeii. Taf. 6, 7. Heidelberg. 1890.

92. Restoration.

The terra-cotta finds at Temple O in Selinus have given opportunity for the restoration of the corresponding principal cornice, which has on the part of the Germans been published by Dörpfeld¹⁰², and on the part of the Italians by Cavallari¹⁰³. We reproduce in Figs. 109 and 110 the efforts of both, with the remark that according to Cavallari, the cornice of the temple would have appeared somewhat high, except that the beautiful crowning anthemion of the gutter tiles, when seen from below, would disappear or its effect would be lost with the observer at a considerable distance. No evidence exists for the addition of the selected cymatium with the trumpet-shaped spouts, and holes through the ashlar supporting the rafters are not found. Moreover, no artisan would permit such eccentricities in the removal of the water. Excepting the doubtful upper ending of the gutter tiles and their fastening to the stone, Dörpfeld's essay should be accepted as correct.¹⁰⁴

Note 102. In 41 *Programm z. Winckelmannsfest d. Arch. Ges. z. Berlin*, Pl. 2. Berlin. 1881.

Note 103. In *Notizie degli Scavi*. 1882. Pl. 19.

Note 104. In regard to colored terra-cottas, also see the succeeding volume of this *Handbuch*, Figs. 182, 183, 50, 54, 55, 186, and 193; also further:--

Durm, J. *Constructive und Polychrome Details der Griechischen Baukunst*. Berlin 1880. Taf. 10.

Hittorf, J. J. *L'architecture polychrome chez les Grecs*. Paris 1846. Taf. 6, 7, 10, 13.

Le Bas, Ph. Taf. II, 1, and Taf. II, 2.

Semper, G. *Der Stil in den technischen und tektonischen Künsten*. Frankfurt a. M. u. München 1860-63.

Rayet, O. & M. Collignon. *Histoire de la ceramique grecque* Paris 1888. Pl. 15, 16.

The raising and setting of the massive cornice blocks of the Temple in Selinus, which frequently measure 727 cubic ft or more ($12.5 \times 12.5 \times 4.42$ ft.), are known to have been done by ropes lying in U-shaped grooves cut on the end faces of the ash-lars. After the stones had been raised, the sling ropes were removed, the stones slid exactly against each other and fitted. The same rope slings could then be used for setting, without the ropes lying in the grooves again, and so on for the other stones.

necessity of tying them again, excepting for those inserted last. On these, instead of the U-shaped grooves on the end surfaces, there are found rectangular grooves continued on three sides, whose inner surfaces are rounded off below. Sling ropes were laid in these, while after setting, the ropes could readily be drawn out (Compare Fig. 89).

13). Ceiling of Portico.

93. Ceiling Beams.

The open space between the columns and the cella walls received its ceiling finish at top by means of slabs of stone, or by a system of stone beams with slabs laid between them.

These ceiling beams must have originally been laid on the architrave with reference to the position of the columns and the arrangement of the triglyphs, formed the termination, and a change in the construction and treatment of the forms first occurred with the adoption of stone construction.

One must assume that Vitruvius used ancient traditions for his explanations and accounts of beam construction; but so much is certain, that already five centuries before Vitruvius, these traditions were no longer held or understood, while not a single Doric building now remaining to us accords with them. The transfer of the architrave to the cella wall indeed occurs (Compare Pronaos of the Theseion), and also the transfer of the entire entablature (architrave and triglyph frieze) above the inner row of columns extending before the pronaos (as in a Temple in Selinus); but we never meet with ceiling beams placed on the architrave itself.

Where stone beams are used, they are set at the same height as the geison, are of rectangular section and are wider than high, with an echinus moulding on the upper part of their sides, the top surfaces are not entirely dressed, but usually only as wide a smooth bed is arranged, as required to receive the slabs. The beams are commonly placed without reference to the columns, and they are arranged at equal distances in the limited space. (Compare Theseion and Parthenon; also Fig. 111).

/4). On the pronaos and posticum of the Theseion and of the Temple in Enigaleia, the end beams extend over two intercolumniations and run parallel with the inside of the frieze, every reminiscence of an original intention of showing the ends of the beams

in the frieze disappearing.

Therefore the beams at the pediment ends run at right angles to these, and on the sides they are at right angles to the architrave and the cella wall.

94. Ceiling Slabs or Stroteras.

In the beams lie the covering and space-enclosing slabs, the Stroteras (coffered slabs) with coffer-like sinkings or perforations; rebates were further cut around the rectangular openings in the slabs, in which were laid smaller ceiling stones, the space-closing Calymmatias, whose ground was not wrought flat but somewhat curved. But in addition to the square sinkings, others of lozenge form also occur, as on the Temple in Phigaleia. The coffers were not made of equal size, three different sizes being arranged beside each other on the Parthenon and at Phigaleia.

This characteristic construction and subdivision of the stone ceiling by beams, stroteras and calymmatias (Fig. 112) is only peculiar to the Grecian style of architecture; rectangular dividing beams are indeed found on the ceilings of the Grotto-Tombs in Beni-Hassan, cut in the solid rock, between which are wrought plain ceiling surfaces in form of flat vaults, thereby being divided in square spaces decorated with allied ornaments, so that in regard to form, these ceilings might supply the model for the Grecian ceiling, though not in construction. The same idea lay at the basis of the decoration of both; we find in both the panels of the ceiling sprinkled with stars.

The rather careful and minute construction of the ceiling of the Theseion¹⁰⁵ is abandoned on the Parthenon (Fig. 114); instead of the small ceiling pieces above perforated slabs, calymmatias wrought on the same piece with the slabs are used. The transition from the lower surface into the curved back-ground of the coffers is then arranged in two recesses, whose transitions are formed by small echinus mouldings. The construction is still more simplified on the ceilings at the sides of the Parthenon and the Temple in Phigaleia; even the beams are there entirely omitted, the ceiling being entirely constructed of coffered slabs resting on the cella wall and on the frieze.

Note 105. How much economy was here practised is shown by a place now become visible, where thin slabs were inserted instead of the wall beam. (Fig. 113).

149. The horizontal borders surrounding the coffers separate painted or sculptured beaded astragals (Compare Parthenon and Theseion); fret patterns cover the horizontal surfaces (Parthenon), eggs-and-darts cover the separate echinus mouldings (Parthenon, Theseion, Propyleion), and golden stars on a sky-blue ground cover the back-ground of the coffers, a motive recalling the covering of the sky, and which characterizes the ceiling as a shining starry-ceiling (Uraniskos).

Golden palm ornaments on a blue ground, developed towards and from the centre, replace the stars on the ceiling of the Propyleion. Bötticher wishes to restrict the use of stars to the ceilings of consecrated apartments alone, and therefore refers the coffers decorated by palm ornaments to the side passages of the Propyleion, for the central passage alone was the sacred way,-- an opinion not accepted by every one.

95. Decoration and Dimensions of the Stone Beams.

The cornice extending beneath the beams above the frieze and above the cella wall (Compare Theseion and Parthenon) was decorated on its vertical surface by a richly painted fret pattern, the crowning member being ornamented by recurved leaves, and the ogee by heart-leaves. The beams have leaf ornaments on their echinus mouldings; their under surfaces were probably ornamented by painted interlacing bands, the last assumption being justified by the box-shaped terra-cotta facings in Metapont.¹⁰⁶

Note 106. See also; Baunack, J. Aus Epidauros. Eine epigraphische Studie. p. 70-75. Leipzig. 1890. . . IV. The stone ceiling of the Temple of Asklepios,-- especially p. 72-73, on monolithic ceiling slabs as well as on the decoration and painting on stroteras and beams.

The beams in part rest on iron pins; they are connected with the interposed beams by H-cramps (Compare Parthenon).

At the Parthenon, the beams have a sectional area of 6.57 sq. ft. for a length of 14.34 ft. and a bearing of about 1.97 ft.; they are loaded with about 22000 lbs. Beams worked concave are mentioned as found at Phigaleia.

14). Ceiling of the Cella.

96. Hypotheses.

Unfortunately, no vestiges of the ceiling of the cella are

now preserved, and no monument throws any light on what it was, of what material it consisted, and how it was constructed. The complete lack of the structural portions appertaining thereto in the ruinous condition of ancient temples, permit it to be safely assumed that these ceilings were of perishable material, and the knowledge of so many conflagrations of temples, that they were made of wood. Not proven for most is the law, that on account of its considerable span, the central space of the cella could be covered with wood alone.

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157 The central aisles of the Temples on Egina, in Phigaleia, and of the Heraion at Olympia, measure 10.73, 14.47, and 12.47 ft.; architraves and stone beams in lengths of 14.63 ft. (Temple C in Selinus), 13.98 ft. (Parthenon), 17.82 ft. (Propyleion), etc. occur as sufficient, both constructed of common limestone as well as of marble. The possibility of a stone ceiling then existed in case of the given widths of centre aisles, even though I may doubt its use.

A passage of Pausanias in reference to the Heraion in Olympia gives some points in regard to the arrangement of the ceiling and the roof.

During repairs made to the latter, "The corpse of a heavy-armed soldier was found between the two ceilings, one of which was for ornament, the other for supporting the roof". It results from this, that a decorative horizontal ceiling covered the cella, and an empty space existed between this and the pediment roof. In the construction of the closed ornamental ceiling, transverse beams were probably first placed at fixed intervals, then crossed at right angles by longitudinal beams lying on them, the interspaces being again divided in panels by short beams and closed by board panels above.

Coverings of terra-cotta enclosing the beams on three sides in box shape and shining with rich ornamental colors, their under surfaces decorated by interlacing bands, coverings of plates of the noble metals and by painting, may have produced in these ornamental ceilings a magnificent effect. Pausanias mentions in Athens "chapels with gilded ceilings, decorated by alabaster and paintings"; wooden beams and calymmatias are mentioned in the era of the Diadochides as entirely gilded and ornamented by ivory and mosaic work.

The wooden ornamental ceilings probably extended over both the centre aisle and also the narrow one of two story side aisles.

15). Pediment.

97. Tympanum.

The pediment was the most expressive external decoration of the end of the Grecian temple, -- it received the most prominent sculptured ornamentation of the house of the deity, which from a protected niche surmounted by the widely projecting roof cornices and standing firmly on the bold geison, shone down on the person approaching, while still distant, splendid in its sublimity and fascinating his gaze and his soul. Deeds of gods and of heroes are represented in them; one bringing offerings would involuntarily be aroused in spirit and prepared by this exhibition long before entering the sanctuary; his thoughts would be diverted from external things, and he would himself be strengthened in the belief in the power of the particular deity by the sight of the glorifying representation of his deeds.

The pediments of the Parthenon were decorated at one end by the Birth of Pallas (Minerva), and at the other by the Contest of Poseidon and Pallas¹⁰⁷. On the Temple of Zeus in Olympia was the Chariot Race of Pelops and of Oenomaos with Zeus as a central figure between the champions, at the other end being the Combat of the Lapithae and Centaurs at the Marriage of Perithoos, where the hero Theseus keeps off the Centaurs with his axe. In one tympanum in Tegea was the Calydonian Hunt, on the other the Combat of Achilles with Telephos. The tympanums of the Herakleion in Thebes were filled with works of Praxiteles representing the Labors of Hercules. Artemis, Lato, Apollo and the Muses, stood in the pediment in Delphi; Dionysios and the Thyades adorned the rear pediment. On Egina were Combats from the Trojan War, Pallas protecting the corpse of Patroclus. We always see the deity standing and distinguished as a principal figure in the triangular space. The composition must be adapted to this form and it was so suited with extraordinary skill. The forms standing next the central figure appear in a position similar to this, though often bending somewhat, the next stooping more, and then come persons sitting or kneeling, and at last those reclining, always following the form of the inclined pediment cornice in place and position. Only by means of these gradations in altitude and pose

could the space be filled with figures of equal sizes. 108.

Note 107. See Sauer, E. Die Standplatten der Gieblegruppen am Parthenon. Antike Denkmäler u.s.w. Berlin 1891. Bd.1, p.48-51. Taf. 58 A B C (especially the section on arrangements for setting the statues, marks of fastenings, new figures in tympanum (patina), western and eastern pediments) Also the Parthenon Drawings of Nointel's Anonymous, those of Carrey in Antike Denkmäler etc., Bd. 1, p.2, taf. 6, 6 a. Berlin. 1891.

Note 108. Treu, G. Die Anordnung des Ostgiebels an Olympischen Zeustempel. Jahr. d.Kais. Deutsche. Arch. Inst. Bd. IV. 1889. Berlin, 1890. p. 206-311(especially the appendix on p. 304, as well as on Taf. 8 and 9 the various illustrations by G. Treu, F. Studniczka, E. Kekule, and E. Curtius); also the view of J. Six in Jour. of Hell. Studies. Vol. 10, 1889, p.98 e.s., which is summarized in the above mentioned volume (p.304), and which appears best and most acceptable, judged from a purely artistic point. For the western pediment, see Jahr. d.Kais. D. Arch. Inst. Bd. 3, Taf. 5, 6. 1888. Berlin, 1889.

On the Temple on Egina (Fig. 115), exactly in the centre stands Pallas armed with the spear; right and left of her stand marching, sprawling, spear-throwing warriors; the vacancies at the base are filled by the fallen Patroclus and a Trojan bending over him; then follows a kneeling archer, behind whom a kneeling spearman bends forward; the angles are filled by prostrate wounded men.

The figures were all wrought in the round, mostly carved in limestone or fine marble (they were made of potter's clay on the roof of the Royal Hall in the Keramikos at Athens; also see Art. 15), and stood free on the geison, which was thus loaded on its front by a not inconsiderable burden, the geison slabs are loaded by the tympanum wall, which closes the triangular opening of the gable roof and is covered by vertically joined slabs (as on the Parthenon and Theseion), or arranged as horizontally coursed masonry (as on a Temple in Akragas and also at Eggesta; See Fig. 116). To obtain more space for the display of the figures, this background is not set in the same plane with the front surface of the architrave, but is set back behind this from $1/8$ to $1/5.5$ times the thickness of the architrave (Compare Parthenon, Egina, also Figs. 117, 118).

Decoration by color likewise occurs here as an enrichment; the tympanum was covered with a dark-red tone, from which the groups of figures stood out clearly; but the variously colored figures may also have stood before a light back-ground of the tympanum, since we have examples of both; the naked portions of these may have only received a transparent tone of flesh color, while the draperies displayed all the colors usual in clothing and may have had a wax polish; the weapons shone with the gleam of gold, which was laid on the stone, or spears, helmets and shields were entirely made of the noble metals and fastened to the marble.¹⁰⁹

Note 109. In regard to the great question of the sculptured decoration of the tympanums of the Parthenon, see:-- Fuchstein, O. Die Parthenon Sculpturen. I. Phidias. Jahr. d. Kais. D. Arch. Inst. Bd. V. p. 79 e.s. Berlin 1890. Also:-- Blümner, H. Der Meister der Parthenon Sculpturen in Beil. z. Allg. Zeit. 1891. No. 113.

98. Acroterias.

The angles and apex of the pediment received a special decoration by the so-called acroterias. Animating the outline of the building in an effective way and emphasizing these especially expressive parts, they stood at the angles on massive stone pedestals above the cymas, employing chimeras, fanciful animal forms, small figures, or decorative compositions of scrolls and palm-leaves (anthemions), such as we also find crowning sepulchral steles or vases as well.

154. According to Pausanias, there were gilded prize vases on the angles of the Temple of Zeus in Olympia, and a gilded Nike exactly above the centre of the pediment, under whose statue was fixed a golden shield, on which was to be seen the Gorgon Medusa in embossed work with an inscription beneath.¹¹⁰ For one of the Treasuries, a shield with inscriptions is mentioned above the apex of the tympanum, in the tympanum itself being the Combat of the Gods and Giants in relief.

Note 110. The inscription was found, and it stood on a stone base, which was fixed on the apex of the pediment and bore the shield of Tanagra. See Arch. Zeit. 1882. p. 179-188.

The crowning ornaments of the angles and apex of the pediment of the Temple on Egina (Fig. 119) still remain to us (pres-

(preserved in Munich); they are griffins carved in marble, which were indeed originally painted in colors or gilded, and two slender draped female figures, which stood on the right and left of a lyre-shaped raised scroll ornament, which was crowned by a vertical palm ornament. Only a few insufficient fragments of a similar ornament from the Parthenon are preserved, from which we may infer a decoration of the apex of its pediment allied to that of Egina. Data in regard to the angles is wanting; there are now merely square openings cut in the starting stones at the angles (Fig. 120), in which metallic or marble vases, figures, or ornamental decorations were once fastened; no vestige of these any longer remains¹¹¹.

Note 111. Statue acroterias on the ridge of the Temple in Delos were proved and restored by Furtwangler. See Arch. Zeit.

¹⁵⁵ 1882. p. 335-346.

¹⁵⁶ No structural reason exists for the use of these acroterias; the stone bases required for them could not easily be formed of smaller blocks of stone; these blocks are now wanting on the Theseion, on the so-called Temple of Concordia in Akragas, and on the Temples in Egina and Paestum, while the pediment cornice slabs are still in place and undisturbed; if these angle stones were placed there as a necessary loading to oppose the thrust of the obliquely inclined cornice slabs as an abutment, these latter would have slid down on their removal, which is not the case and is impossible, from the construction of the end blocks of the pediment, the bond, and the form and position of the intervening pieces.

On the Parthenon, the base stone lies in the angle of the hollowed-out marble gutter, loading this, but rather tending to overload and tilt over the projecting parts, than to fix them. The same was the case with the central acroteria, since the base stone was also there placed in the cyma, on the freely projecting, and not on the supported portion of the cornice slabs. (Compare in this respect the drawing of the acroterias of the Temple on Egina, and Fig. 119).

99. Acroterias in Volute Form.

Acroterias in the form of volutes for Grecian buildings were not previously known. They were found in the rubbish on the Acropolis in Athens and were first published in the authority

mentioned¹¹². The foundations of the building to which they belonged could not be more fully determined. Pieces of the cymatiums belonging to them had long been known and had been published in different places. In 1869, they still lay with other colored fragments in a heap in a small shed of boards on the Acropolis. But the material had not then been thoroughly sifted and did not exhibit the cymatium at all in its perfect condition, as for example, the red and white chess-board band on drawings made in the forties was wanting, and the blue color on later ones. Pieces examined and drawn by the author in 1869 exhibited no vestige of blue color, while this was given in the twenty years earlier drawings of Hochstetter, although only in the rings and not on the leaves; on the other hand, the crowning head-band was lacking.

Note 112. Antike Denkmäler. Herausg. vom Kais. D. Arch. Inst. Band I. Heft 5 (1890). Berlin, 1891.

"The colors on these painted marble cymatiums are of an earthy nature and fade very easily¹¹³" to which fact is to be ascribed the different statements. The ornaments colored blue and red are lightly wrought with the chisel, and the colors are laid in the sunken surfaces and lines.

Note 113. See same, p. 36, and Taf. 50, from which Fig. 121 is reproduced.

100. Acroterias of Wood and of Clay.

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The stone acroterias of the marble roof were preceded by those of clay for the tile roof, and the latter by those of wood for the roof with wooden cornice. Examples of the latter are preserved to us in the Phrygian rock-cut tombs, in which the face-boards of the foremost pair of rafters extend far above the intersection at the apex, as we still see in the Tyrolese wooden houses, forming a characteristic decoration. The development of the form of the acroterias then corresponds to the peculiarities of the different materials, - wood, terra-cotta, and stone.

Stone permitted execution in the way of sculpture, by its greater resistance to exposure, wood admitted of only sawed-out or carved work, which were chiefly simple and effective outlines; (See Figs. 179, 180, p. 264, 205, in the succeeding volume of this Handbuch); clay required closed forms, within whose outlines could be employed relief ornament, which color could make

make more prominent and effective. An example of the last kind
 158 is given by the fragments found in Olympia and preserved, which
 belonged to a semicircular acroteria on the pediment of the Her-
 aion, and which is shown with its connections in Fig. 122. A sim-
 ilar circular form of the pediment acroteria was also made known
 by Le Bas¹¹⁶.

Note 115. See: - *Die Funde von Olympia. Berlin 1882. Taf. 38.*

Note 116. *In Voyage archæologique en Grece et en Asie mineure.*
Paris 1848. Sect. Architecture. Pls. II 2, II 5, II 7, III 11.

16). Roof of the Temple.

101. Framework of the Roof.

The temple roof (Aetoma) forms the external protecting cover-
 ing of the building; constructed as a low gable roof, its two
 roof surfaces intersect in the middle line of the structure and
 conduct the rain water toward the sides. We indeed no longer
 possess any direct data on the construction of the framework of
 the roof, since from the perishable nature of the wood and ma-
 terials of which it was composed, no remains at all are preser-
 ved to us; yet we can decide on its original form with tolerable
 certainty from the covering materials preserved, from the holes
 cut in the stone cornices of different temples, and from build-
 ing contracts.

159. According to these, the framework of the roof was constructed
 of inclined rafters and purlins parallel to the eaves; the pur-
 lins could then rest on the pediment walls and also on the trans-
 verse walls of the pronaos and posticum, which were indeed usu-
 ally extended up to the rafters, as may still be seen on the so-
 called Temple of Concordia in Akragas, (An opening at the mid-
 dle of this upper wall permits access to all the attics and
 makes possible an unrestricted inspection of them), or on the
 side walls of the cell, which might also have been extended up
 to the rafters, to serve as a support for them instead of a
 purlin, as Hittorf restores Temple B at Selinus, for example.

A construction with horizontal rafters, as assumed by Viollet-
 le-Duc and also by Hittorf for another temple, and which has al-
 ways been used in the South until the present time, may have
 likewise existed.

Sheathing appears to have never been used; the tiles were
 then either hung on horizontal purlins by their projections, or

were directly laid on the upper surfaces of inclined rafters.

A ridge purlin and two roof purlins were assumed in Phigaleia, which rested on the different pediment walls; on these lay the rafters resting against each other at top, cut in dove-tail form at the lower ends and resting in seats cut in the geison.

The rafters were placed about 2.08 ft. between centres; the height of the roof in most temples amounted to between $1/7$ and $1/8$ the width of the temple measured above the architrave.

Since the rafters did not extend down over the geison, the inclination of the roof must either be worked on this from the ends of the rafters outward, or as was frequently the case, a separate inclined piece must be laid on it, and which then ended in front in the form of an ogee moulding. If cymatiums were carried along the sides, they were on the inclined pieces: in other cases the roof tiles rested on them.

Interesting points on roof construction are given by various ancient building contracts, which indeed do not primarily apply to roofs of temples, but to those of secular buildings: Here is again the previously mentioned building contract for the Arsenal of Philo. (Lines 45-58). The passage in question runs thus ¹¹⁷ -

(See Greek text in Durm).

Note 117. In Corpus Inscrip. Attic. II. 2. No. 1054. Berlin, 1883.

160. Translated in to German and thence into English:--

"Set capitals of Pentelican stone on the piers. On these rest wooden architraves, which are fastened to the pieces and are 2.5 ft. wide and 2.25 ft. high, measured from the highest point, 18 in number on each side. (The architraves, which are regarded as purlins, are dressed off on top to the slope of the roof). Place intermediate beams over the middle passage on the piers, equal to the architraves in thickness and height. On these lie longitudinal beams (here ridge purlins) 1.75 ft. wide and 1.75 ft. high, exclusive of beveling, under which are wooden caps 3 ft. long and 1.5 ft. thick. The purlins are to be fastened with pins on these and on the intermediate beams. On these rest the rafters (sphekiskoi) 6.35 ft. high and .94 ft. wide, at distances of 1.25 ft. apart; then longitudinal strips (himantes) .50 ft. wide, .125 ft. thick and .25 ft. apart; lastly, on these are to be boards (kalymmata), .06 ft. thick and .38 ft. wide, fastened by iron nails; after these are coated (dorosas, with

clay and straw), the roof will be covered with Corinthian tiles, one tile locking over another."---¹¹⁸

(Note 118. Bohn's translation (in *Cent.d.Bauw.* 1882, p.295-296) skips some important words, especially "dorosas", the covering of the sheathing of the roof (with clay and straw). "Pier" is preferable to "column". The restoration of the section is not satisfactory and not acceptable.

We deduce from this that the roof was constructed with inclined rafters, and that in the three-aisled interior the vertical supports of the purlins were stone piers, that the arrangement of a ridge-purlin resting on a wooden cap and the strong transverse beam beneath this was chosen, and that the feet of the rafters did not rest on a plate, but were let directly into the ashlar of the gelson; further that on the rafters was laid a sheathing coated with clay, on which the clay tiles were set (see Fig. 123, after Choisy's restoration¹¹⁹).

Note 119. With the restoration by Choisy, that published by Fabricius mostly agrees. (*Die Skenotheke des Philon, das Zeughaus der Attischen Mahine in Zea. Hermes, Zeits. f. class. Phil.* 1882, p.551-594). The clear and excellent interpretation of the text, which Fabricius gives in his essay, will be read by every practitioner with pleasure. Except that the surprising statement is made (p. 582); "It is well known that no other mode of fastening the tiles, especially that by nails on the rafters, occurred in antiquity", -- while yet the *Lex Puteolana* expressly requires the nailing of one row of tiles with iron nails.

Less clear is the case in the contract for the restoration of the Athenian Walls (*Corp. Insc. Attic.* II, 1, No. 167), which Choisy (in his study: *Les Murs d'Athenes.* Paris 1884) treats in a truly ingenious but not entirely satisfactory manner. He takes up the matter as too beautiful and too artistic, when it concerns the repairs to a fortification, that has fallen. Therefore his translation and interpretation of lines 63-73 do not correspond to the Greek verbatim. As far as the top of the wooden ceiling (See Fig. 104), he may be followed, though not without objection, since it is not definitely stated, that the pier must be carried to the same height as the wall, and a projection of the beams beyond the wall and piers is not specified. But in the passage (See original in Durm) occurs an interpretation, which

it is still harded to accept. He arranges work that can only be performed after that described later is completed. He first requires on the beams of the ceiling or roof a superstructure of unburnt bricks or pise, and after this the substructure, i.e., the supporting sheathing and the beams to prevent sliding. But the addition of the rather modern, bomb-proof, mass of earth (M in Fig. 104) above the woodwork of the ceiling is not mentioned in the specification, and this work is so great and so important, that one would not have forgotten to mention it.

161
162 Choisy assumes all succeeding work to be on both sides; but nothing of this likewise remains in the building contract. This double work would not have been omitted by a Greek in the letting of work.

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C.O.Müller assumes a shed roof instead of Choisy's gable roof, and longitudinal beams from pier to pier instead of the transverse beams, which corresponds better to the conditions according to our opinion. The passage cited reads as follows, plainly translated:--

----"After he has made ready the wooden framework of the ceiling, he will set on the wall the straight geison of the cornice, projecting sidewise 1.5 ft., and will set on this the upper piece of the cornice (akrogeison), true and plumb, 7 ins. wide, 1 palm (handbreadth or 4 fingers = 3.5 ins.) thick while he cuts out on the inner side the thickness of a board and dresses off the top in accordance with the slope of the roof. He will lay on the inside boards 1 in. thick and 5 ins. wide with intervals of 3 palms (10.5 ins.), and (fasten them) with iron nails. And after he has thrown upon them plastering reeds (dry reeds, the canna of the Italians) with an under layer of chaff (pieces of reeds or chopped straw) or reeds, he will cover this with a layer of clay mixed with straw to the thickness of 3 ins. And he will cover the entire extent of the enclosing walls with Laconian tiles, and he will set the hegemones, where they are wanting, entirely in clay, flush with the face of the wall. And he will set the covering tiles entirely on a bed of clay.

And he will mould the outside with a Corinthian cymatium, while he trims off the ends of the beams properly, and sets the former exactly in the plane (of the wall) and plumb ---".

In the now defective inscription is also mentioned a coating

with clay and straw, though this work does not appear in the details. Choisy's drawing could scarcely be derived from this, and we are then poorer by one idea in construction, by the tile roof without rafters, which is likewise followed by Dieulafoy, and has its result in the convex clay and straw terrace roof of the early period. (François vase). But here is likewise certain the "dorosei pelo ekuromeno", .. the covering of the sheathing with clay and straw and the bedding of the tiles in this.

102. Covering of the Roof.

The most primitive covering of the roof was that with clay and straw, which was succeeded by that with burned tiles, employed everywhere for the older temples; their form and the system of tiling was the same that is now common in southern countries; large flat tiles (imbrices) with edges curved upward at the sides were laid side by side, and the joint was made watertight by covering it with a cover tile (calypteres).

The clay tile roof was followed by the marble roof; the system and forms of the former were transferred to the latter¹²².

Note 122. See 41 Programm zum Winckelmannsfeste der Arch. Ges. zu Berlin. Berlin, 1881. p.16-22.

103. Earliest Clay Tiles and Cover Tiles.

The slightly curved bed tiles with semicircular cover tiles are to be regarded as the earliest form of clay tiles and of their system, which were laid just as on mediaeval roofs, or as today on common Italian hollow tile roofs. Flat tiles with projecting water-drips were then used along the gutter, and these were firmly held by nailing to the rafters.¹²³

Note 123. Compare Lex Puteolana and the corresponding passages in the succeeding volume of this Handbuch (p.205, Art. 190).

The dimensions of the tiles vary in width from on an average between 1.31 and 1.64 ft. and in length from 2.62 to 3.61 ft.

Their upper surfaces were frequently covered by a fine skin of /63, finely washed clay, left in its natural clay color of light yellowish gray or reddish, as shown by specimens from Olympia, Argos, and Mycenae. The tarring of tiles in Epidauros is authenticated.¹²⁴

Note 124. See Baunack, J. Aus Epidauros. p.88. Leipzig, 1890. Inscription, line 239:-- Timasithoesi pissasios ton heramon--- 60 drachmas 5 1/2 oboli (1 drachme ~~is~~ 4.36 grams of silver).

A slightly curved tile found near the Kerameikos in Athens is 1.67 ft. wide, 3.28 ft. long, and 1.57 ins. thick, made of light yellow clay, and it has two imprinted stamps, the upper one containing the words "SOKLES ARCHITEKTON". The light yellow clay is found in manufactured articles, both in the Greek mother country, as well as in the colonies.

104. Flat Tiles with Cover Tiles.

The curved tiles were followed by the plane flat tiles with sides turned up, whose devices for jointing exhibit the greatest diversity. But with the covering of the plane tile, the cover tile likewise changed its form; more commonly they were burned in a single piece with the former (see fig. 108, fragments from Athens and Olympia). The sloping form of the cover tiles must form the half round space, so that these slopes were plane or curved, as shown by different examples. A piece of the former was coated with dead gloss red clay, as found on Samian pottery; others exhibit a clay more like Sienna, and painted or relief ornaments heightened by color.

105. Repairs.

Broken tiles were considered worth patching, as shown by pieces in Athens, where cracks are held together by small lead cramps. So-called riveted tiles were made known by Koldewey¹²⁵ for Assos, Olympia, and Khorsabad.

Note 125. Die Antike Baureste der Insel Lesbos. p.46. Berlin, 1890.

106. Peculiarities.

Peculiarities in preparation are shown by some fragments of Athenian marble tiles, whose surfaces for the running water are smoothly polished, while their margins, joint surfaces and joint bands, as well as their backs, are roughed out, the joint bands bearing setting marks in the form of letters, and which are also similarly found on marble tiles in Epidauros (Fig. 124). A fragment of an Athenian marble tile shows a narrow band set off by a line, in which are found two blind holes for pins.

Fragments of antique roof tiles were found in Ephesus near the Artemesion (now preserved in the British Museum in London, one of which comes from the older Temple, burnt 338 B.C., and the other from the rebuilding commenced by Deinokrates), which have the so-called hooks on the lower side. On the fragment from the later Temple, this projecting hook (3.54 ins. wide, 2.95 ins. long, and .96 in. high) is placed close to the left upper corner, at the side,

but .59 in. from the upper end. Since a second fragment of the right upper corner of another tile has a hook at exactly the same place (Fig.125), the complete tile must have had two hooks at top.¹²⁶

Note 126. Compare Fuchstein in Woch.f.Klass.Phil. 1890. p. 1409-1410. -- What is further said there on this point is not entirely clear technically. Boorman remarks in reference thereto, that the Ephesian fragments "attest marble tiles with hooks, which may only have been intended to hook on horizontal strips".

For purposes of ventilation and lighting, special pieces were made for both the tile and the marble roof, examples of which may be found in the succeeding volume of this Handbuch (Figs. 198, 199, 291, p.220, 317).

164. 107. Ridge Tiles.

The ridge was either covered by large cover tiles, in whose sides the other cover tiles were inserted, or a kind of mouth-piece was allowed to project from them, into which the ends of the cover tiles entered, or saddle-shaped cover and flat tiles were bent up at the ridge according to the form of roof, thus protecting it in an excellent way. The continuous cover tiles were grooved together; the joints were often made especially prominent by rolls (Olympia, Selinus), and on their crests were again placed palm leaves parallel to the eaves (Figs.119, 126¹²⁸).

Note 128. Compare Olympia, Treasury of the Geloans, Selinus, also Figs. 126, 54, 55, p.60, 61, of the succeeding volume of this Handbuch, where the mode of painting these fragments is given, as well as Jahr.d.Kais.D.Arch.Inst. 1887. p.69,71.

108. Antefixas.

On roofs without water gutters along the sides, the cover tiles were brought forward to the front end of the drip tiles, and the latter then received a disk-shaped decorated plate to conceal or close the opening. These antefixas or vertically aspiring anthemions were repeated at short intervals and ornamented the eaves of the side in the most beautiful way. They were later, as on the Parthenon, independent of the cover tiles, arranged without any connection therewith, therefore serving for no particular purpose, but were merely of an ornamental character. On roofs with collecting gutters, antefixas are more frequently placed on the cymatium, which results from structural reasons in order to conceal the joint between two adjacent pieces of the cymatium by lengthening

the cover tile to the upper edge of the cymatium,¹²⁹ (See Fig. 122).

Note 129. See interesting examples of terra-cotta antefixas in A-- Campana, G.P. Antiche Opere in Plastica. Rome. 1842. -- Also ornamented antapagmenta (facing plates) and antefixas with entire figures from the temple in Alatri. (Bassel. Neue aufgefundenen Tempel in Alatri. Cent.d.Bauw. 1886.p.197-207).

The Attic monuments of the era of Pericles had marble tiles only, which are also particularly mentioned by Pausanias; he says in regard to the Temple of Zeus in Olympia, that the roof was not covered with burnt tiles, but with Pentelican marble cut in the shape of tiles, a procedure first introduced from Naxos by Byzes.¹³⁰

Note 130. The industry of cutting roof tiles from marble must have been native to Naxos at certain periods, according to recent investigators. The remains of the tiles of the Temple of Zeus found in Olympia (thus opposed to the statement of Pausanias, Book V, Chap. 10-13), and also the fragments of the tiles of the buildings on the Acropolis of Athens erected before the Persian invasion, were of coarse-grained white island marble, like that furnished by the ancient quarries on the northern end of the island of Naxos. The roof tiles of the Parthenon and of the other buildings erected on the Acropolis and in the city of Athens after the Persian era were made of the lower white Pentelican marble, the upper surfaces of these tiles appearing to have been sawn, and the lower to have been chiseled. (See Lepsius, G.R. Griechische Marmorstudien. From the appendix to Abhand.d.K.Preuss.Akad.d.Wiss. z.Berlin. 1890.)

17). Dimensions of Temples; Symmetry, Proportions, Unit of Measure.

109. Length of Facade.

In regard to the magnitudes of temples, it may be briefly stated in conclusion, that a majority of the houses of the deities do not exceed a certain average size of about 78.74 to 98.43 ft. for the facade (end), so that on very many monuments, the details described do not differ much in dimensions.

But the given average length of facade is also reduced to one half or is increased to about double, so that for example, the Temple on Egina was repeated about four times in the dimensions of the Temple of Zeus in Akragas. (Fig. 127).

Here occurs an important difference in the dimensions of the capitals, the triglyphs, the geison, etc., and yet the same forms are always retained, and then sometimes suffer an exaggeration to the colossal, sometimes a reduction to the delicate. The small annulets on the echinus, the regulas and drops, the treatment of the triglyphs, the mutules, and the geison on the small Temple on Egina, are entirely similar in form to those of the giant of Akragas. ^{131.}

Note 131. Wherever the Temple on Egina is mentioned in the preceding, that one located on a high hill of rock is meant, called the Temple of Athena (by an earlier reading dedicated to Zeus Panhellenios), from which came the famous pediment statues preserved in Munich. Of the so-called Temple of Aphrodite located on the seashore, only the shaft of a column without its capital is now standing.

For lack of something better, the designation of the temples in Selinus by letters assigned by Hittorf will be retained, thus A to D for the temples of the Acropolis, E, S and T for those of the eastern plateau, for which Serradifalco later introduced the letters E, F and G (likewise Benndorf in *Die Metopen in Selinunt*).

For sake of brevity, the names of the locations of the temples are frequently employed instead of the often very doubtful appellations of the temples.

110. Symmetry and Proportion.

What we understand by good proportions of a building was designated "symmetria" by the Greeks. From this we have derived the word "symmetry", but which signifies something entirely different; for a building may be symmetrical according to modern ideas, but does not therefore require to have good proportions.

111. Theory of Proportions.

The foundation of the theory or principles of good proportions in Greek architecture has already greatly busied our learned men and practitioners. ^{132.}

Note 132. In this connection should be mentioned:--

Viollet-le-Duc. Dict. Rais. de l'Arch. Franc. etc. Vol. 7. p. 532-536. Art. Proportion. Paris. 1864.

Viollet-le-Duc. Ent. sur l'Arch. vol. 1. p. 395-406. Paris. 1863.
---"It would cause deception to believe that proportions in arch-

architecture are the result of instinct. There are absolute rules and geometrical principles."--

Aures. *Nouvelle Theorie deduite du texte meme du Vitruve.*
Nimes. 1862.

Henzlmann, E. *Theorie des proportions appliquees dans l'architecture depuis la XII Dynastie des rois Egyptiens jusqu'a XVI siecle.* Paris. (Reviewed by A. Zeising in *Allg. Bauz.* 1868, *Literaturblatt*, p. 81-88).

Pennethorne, J. and E. Robinson. *Geometry and Optics of Ancient Architecture.* London and Edinburgh, 1878.

Dumon, R. *Le theatre de Polyete, reconstitue d-apres un module.* Paris. 1890.

According to ancient procedure, it would be required that the design for a structure should once be made and laid out in all its details according to fixed numerical ratios, which work must then be followed by corrections demanded by the best point of view for the observer of the building in reality, i.e., after its completion, by the laws of optics, by the immediate surroundings, etc., for design and execution are not always concealed in the effect. The originally firmly fixed dimensions of the building thereby suffer small changes, for some parts must be made smaller and others larger. Plato says with this meaning--
"Were an artist to conceive the beauty of a monument to depend on the exact carrying out of symmetry, he would only have to consider that the higher parts thereof seem smaller and the lower parts larger, than are required to produce perfect harmony. The true artist therefore neglects the requirement of rigid truth, based on the execution of exact symmetry, and adopts in the image of his work proportions and irregularities, which satisfy the requirements of beauty in appearance, even if the requirements of truth must thereby be neglected.

If the procedure in antiquity was in accordance with the statements of Plato, we do not in our geometrical drawings of antique buildings have before us the original symmetrical designs, but the corrected ones, or to exaggerate, the caricatures of the former. In order to find the key to the symmetrical numerical ratios, we must then correct the drawings with reference to the local and other conditions, which at the time determined the correction of the symmetrical design, but which in most cases must have its own difficulties! Most of the attempts to discover the

key by the methods of triangles or squares, or by the module, (when sometimes the lower and sometimes the middle diameter of the column is taken as the unit), indeed for the given reasons lead to no uniform result. The most recent attempt of Dumon, (*Theatre de Polyclète*) to discover the module of Polyclitos likewise does not overcome these difficulties, and he finally consoles himself with the principle, "that for the purpose of beauty or even of utility, artists departed from the accurate drawing in the execution", and Chipiez (*Revue Arch. Serie 3, Vol. 7, p.98-99, 1891*) adds in his review of Dumon's work, that just to variations from the rule, do the greater part of Grecian architectural creations owe their grace and beauty. As soon as the required corrections are omitted, one has to do with a work, whose esthetic worth is no higher than that of a building, constructed by an engineer according to a "formula".

We may therefore repeat and aver that the two principles, according to which Grecian architects labored, were first the preparation of the design with harmonious proportions, and next the correction of this on the basis of the peculiar conditions.

112. Unit of Measure.

Just as the derivation of the rules for proportions from the executed buildings may lead to doubtful results, it is equally dangerous to desire to accurately deduce from the completed structures the unit of measure employed as a basis for them. On the one hand, we do not know how far the executed dimensions (widths, lengths and heights) accurately corresponded to the dimensions written on the designs; on the other, the dimensions of the parts of the building that should be alike according to the design are frequently unlike in execution, and which part may then have the true dimensions, for example, which of the unequally high columns of the Parthenon agrees with the dimensions of the design? On the great Altar of Hieron II in Syracuse, the stylobate is 71.5 ft. wide on the north side, while the corresponding dimension on the south side is 74.1 ft., thus showing a difference of 2.6 ft.; from which of the two numbers, which were certainly written on the plan, shall the unit of measure be deduced?

Who would succeed today in accurately determining the length of our meter (or foot) from our buildings, if large dimensions

in whole numbers on the plans were alone available for reference! The fact is therefore perceived that scales are not alike on all buildings, that they consist of materials differently affected by the influences of temperature, from which result the differences in laying out dimensions, etc. Inequalities might be pardoned, but not mathematical accuracy!

b. Curvature of Horizontal Lines.

113. Origin of the Theory.

The same feeling that required the entasis of the columns may have made a curvature of all horizontal lines on the building necessary. A passage of Vitruvius (Book III, Chap.4), which relates to an arrangement on Roman Ionic temples was applied to the differently treated Grecian buildings, and made the most of for the benefit of the preceding principle.

"But if a podium is to be made around the temple on three sides instead of the steps, it must then be arranged with reference to this, that the massive foundation, the stylobate, the body of the building, the main cornice and the cymatium, may be in accord with the podium itself, which is beneath the bases of the columns. The podium must be so leveled as to receive an elevation along the middle by oblique supports (scamilli impares); for if its surface were made absolutely horizontal, it would then appear concave or trough-shaped to the eye. But how the substructure and the little supports are to be made to correspond to this will be further treated at the end of the Book", --- though this promised explanation has been entirely lost. Hence this passage of Vitruvius, by its want of clearness and its incompleteness, has repeatedly and especially in the last decades given occasion for multifarious researches, discussions and interpretations.

The makers of sketches and measurements in the last century took no notice whatever of this expression of feeling and of the hints of Vitruvius. First after the emancipation of Greece from the Turkish yoke, when the ruins of antique temples became more accessible, commenced the more accurate researches on the ancient monuments; these were first due to the assiduous German architects, who were employed in Athens under King Otho.

Essays already appeared in the Allgemeine Bauzeitung in the

year 1838,¹³⁵ written by Hoffer, then Architect of the Greek government, in which it was stated that the entablature of the Parthenon was not horizontal, but that the architrave appeared to be lowered at both angles, while all vertical joints still remained close. The same occurred on the Theseion, where all curved lines were parallel to each other, their rise amounting to from 1.57 to 1.96 inches for spans of 104.17 and 44.98 ft. Besides this curvature, there existed another directed towards the temple, whose versed sine was also 1.96 inches.

Reports by the Englishman Pennethorne containing the same opinions appeared in the year 1846 - 7, and in 1851 were published accurate measurements by Penrose of the Parthenon, the Propyleion, and the Theseion. In the very meretorious work by the latter are recorded all defects in workmanship, injuries and faults in construction, and the deformationr, which the structures have suffered in the course of 25 centuries; since they form the nucleus of the publication, the existing curves of the stylobate and of the architrave on the Parthenon and Theseion are treated with especial predelection.¹³⁶

Note 135. Hoffer, J. Das Parthenon zu Athen, in seinen Haupttheilen neu gemessen. A contribution to the Theory of Construction of the Temple by the Greeks. Allg. Bauz. 1838, p. 371, 579, 387.

Note 136. The level survey of the east and west sides of the Parthenon undertaken by the author in the year 1879, agrees in general results with that of Penrose. It exhibits the similar high rise of the courses and particularly shows what is most important, that the four angles of the stylobate do not lie in the same horizontal plane (Fig. 128).

The southeast and southwest angles, which are stated by Penrose to be higher than the northwest and northeas angles, were so found, although according to the author, those halves of the courses extending from the middle to the southeast and southwest angles are somewhat flatter.

The curve is divided in two parts in reference to a horizontal (since their origins do not lie at the same height) has the maximum rise of 3.15 and 3.46 inches for a chord length of 101.5 ft. and a minimum rise of 1.65 and 1.10 inches.

The existence of the curved lines on the buildings and parts of

of buildings mentioned is a matter of fact; the statements given have been doubted by none of the later investigators, who have entered upon the question whether this curvature was originally intended, or was caused by inadequate construction, or in time by force of accidents.

114. Present Condition of the Parthenon.

On the foundations or the substructure of several steps, on the columns and colonnades, on the triglyphs and metopes, one is reminded of the foundations of the Parthenon carried to different depths, of their construction with different materials, partly capable of slight resistance, of the unequal pressures of the coursed steps of the superstructure, of the positions of the columns on two blocks of stone, of their different heights, distances between axes and inclinations, of the metopes and triglyphs not equal among themselves, to which are added numerous other small irregularities, as for example, the circumstance that the regulas and drops are not always placed exactly beneath the triglyphs, that the abacuses of the capitals do not have the same size, often varying in width about 3.53 inches, (6.831 to 6.545 ft.), and such different forms of echinus are exhibited, also that drops and pieces of mouldings are found cemented in, that the four angle columns are not of equal height, etc.

The defects were certainly only very small, and scarcely another building of ashlar masonry in the world, of ancient or modern times, may exhibit as few faults and slight defects in construction as the technically perfected Parthenon, though affected by the imperfections of human powers. Let one but compare in this way the construction of the best structures of the Roman, or even of the Renaissance period. Yet these small faults are avoided with difficulty and do not lessen the worth of the building; it would be erroneous to rate this lower on their account, but it would be equally erroneous to explain these faults as being particular refinements, to discover them, and conceive that their explanation was lost to us.

But besides these small original irregularities, there also occur other deformations arising in later times, and demolitions of the most varied kind. In the course of more than 2000

years, the building has served for the most dissimilar purposes, for the pagan house of a deity, for a Christian church, and for a Turkish mosque.

The marble ceiling of the opisthodomē fell in the year 1403; in 1687 a bomb from Morosini's besieging troops fell in the Parthenon, in which the Turks had stored their powder, and exploded this, shaking the structure to its foundations and scattering the blocks of marble as far as the Museum hill. Elgin and Lusieri pillaged the triglyph-frieze in 1801 = 3, destroying the geison; the building had to endure a violent bombardment in 1826 - 7. "The three common enemies of antique art, Turks, Englishmen, and gunpowder", have also pretty effectively labored here. The external surface of the marble is now everywhere corroded; in consequence of the occurrences described, the steps no longer exhibit any sharp angles or plane surfaces; the stylobate has been much crushed by the falling stones of the cornice, especially at the angles, and other blocks were moved from their original beds by the force of the powder; the columns are in great part overthrown, the separate drums¹⁴¹ of those still remaining upright being twisted from their original beds (Fig. 129), and the cella walls and columns along the sides are overthrown; the architraves are much injured in several places, especially near the angles, the cornices have gaps and are interrupted, and the pediments are but partially preserved. If some portions are still well preserved, with the exception of the everywhere injured external surfaces, the material has resisted the influences of the weather in great part, and the end and bed joints of some blocks are still very close¹³⁷, yet an excellent state of preservation of the monument, as frequently asserted, is entirely out of the question.

Note 137. This is in many places ascribed to incrustation in the joints.

An attempt at restoration made in 1841 - 2 had as its object the reparation of numerous injuries, since with good intentions two entire columns were rebuilt on the north side and others half-way, only the drums of others being raised upright, and the northern cella wall was partially rebuilt.

115. Refutation of the Theory.

The heterogeneous foundations, the various irregularities in

construction, the fact that the four angles are not in the same plane horizontally, the shocks and distortions that the building suffered, the cracks in the architrave, the partial opening of the joints of the ashlar of the stylobate, the jagged projection of some in front of the face line, and the irregular form of the curve, do not permit the assumption of an originally intentional construction of the now horizontally curved horizontal lines. The condition of the building as described no longer permits it to be determined with certainty whether certain unusual and peculiar appearances were intended, or existed on it 2330 years ago. Also the difficulty of constructing such curves, and the consequences resulting therefrom for other portions of the architecture, with the actually invisible effect of this, since the ratio of its rise to its span is very small, and it chiefly lies below the horizon on the substructure, and on the architrave is intersected by the abacuses of the capitals and became quite without effect, these would oppose an intentional arrangement, which would on the other side be answered by a denial of the difficulties. If the construction were so easy, why did not the masters of technical skill then succeed in executing it with regularity? Why could not the first requisite for an isolated and not very large building be once satisfied, and the four angles of the building be placed at the same height? But if the establishment of a curve was intended by the architect, it must then be said that this experiment has resulted quite too miserably and may be characterized as anything but successful, especially if considered as disproportionately enlarged, and not in accordance with its actual insignificance. For finally, what signifies 3.30 ins. or less that 1.18 ins. rise at the middle of horizontal lines respectively 229.66 and 101.72 ft. long, whose continuity is moreover interrupted at the centre by inserted steps for ascent? The jointing of the stones and the entire execution, with all the small defects described and which are inherent in the latter, is nevertheless so perfected, that it would be difficult to pass off as intentional such an imperfectly and awkwardly expressed arrangement as the present curves, if we were willing to accept them as original. For the honor of the Greeks, and on the basis of the evidence cited, we

will let the former pass current in a higher degree for the beautiful Theseion in the face of the much discussed curves of the stylobate, (Fig. 130), as we must likewise ascribe to changes in the ground the different heights of the stylobate of the Heraion at Olympia, where the execution is certainly less refined. Other Doric temples were indeed likewise free from this line of beauty, only "perceptible by the feelings".

/23 A peculiarity in regard to the original curvature, that still remains to be mentioned and affords opportunity for consideration, are the different dimensions of the lowermost drums of the columns; men are commonly inclined to deduce from the unequal measurements occurring on them conclusions in favor of original (curves).

Measuring on the surface in a plane passed through the centre perpendicular to the cella walls, there are found for the separate drums (which, as previously stated, were not of equal height, their heights frequently differing about 5.50 ins.) greater heights on the external surface than on that towards the cella wall; these differences first result from the fact that the pavement of the portico is laid inclined, and they are increased by the inclination of the columns towards the cella wall. But measuring in a plane passed through the centre parallel to the cella wall, differences in measurement are again found on the surfaces of nearly all columns, so that on the pediment ends, for example, the lines on the southern sides have heights differing from those on the northern sides. It is evident that the differences are not great; they lie between the limits of 0.00 and 0.47 inch. Since the larger variations in measurements are mostly near the angles, an appearance might be produced, that it was intended to arrange by the irregularities in this direction an adjustment of the upper surfaces of the drums to the horizontal, and thus render possible a vertical position of the axes of the columns on them. The uppermost adjusting drum would then cause the flatter curve of the architrave.

If one here assumes it to have been the actual and sole intention of the architect of the Parthenon to build with reference to an adjustment of the drums to a horizontal, we must

(Lettering on back)

HANDBOOK
OF
ARCHITECTURE

Copy Part 2
1

GRECIAN

RICKER

optical and perspective-esthetical studies and principles, w
 hich were deduced from these, and some of which are even rid-
 iculous. ¹³⁹ The occasional representation of the actual meas-
 urements by abstract numbers is only to be regarded as an ec-
 centricity.

Note 139. Most of these are not based on a survey by the au-
 thor concerned, but on unlimited faith in the three and four
 figure measurements of Penrose. I have elsewhere shown in reg-
 ard to this, that his statements do not in all cases correspond
 to the actual conditions on the building, and that he repres-
 ents things as better than they are in reality. I have to add
 that many parts, whose dimensions he gives, in general no lon-
 ger exist on the building and also could not have been in exis-
 tence 30 years since. Thus, for example, on the west side, the
 dimensions of the front surfaces of the abacuses of the 1st,
 3d, 4th, 5th, 7th and 8th columns (taken from north to south)
 are no longer to be determined, as well as those of the regul-
 as and drops beneath the 5th, 6th, 7th, 8th, 9th, 11th, 13th
 and 14th, triglyphs, since these were shot away in the bombard-
 ment in 1826-7; likewise those of the 5th, 6th, 7th, 8th, 10th
 and 11th metope slabs, as well as those of the 7th, 8th, 9th,
 10th and 11th triglyphs.

On the southwest angle column (thus the 8th column) of the
 western pediment, the edges of the flutes no longer fit on each
 other; hence the column or the different parts thereof are no
 longer on the old location; the five lowest drums still harmon-
 ize; the higher ones indeed harmonize with each other, but dif-
 fer from the lower ones. This condition is shown in a greater
 degree by the columns of the eastern front; the northeast col-
 umn and the next one have strongly displaced drums (see the cor-
 responding Figs.), as well as the 5th and 8th (from north to
 south).

No longer to be determined, since they exist no more, are the
 measurements of the fronts of the abacuses of the 3d, 6th, 7th,
 and 8th columns of this side, of the southeast angle of the arch-
 itrave, of the 7th, 11th, 14th and 15th regulas and drops, or of
 the southeast angle triglyph.

Of the 13 columns of the southern side of the Theseion, but a

single one has remained in position; in all others the drums are irregularly displaced (Fig. 131), and scarcely one of the many is in its original position; the same occurs in an equally striking way on the next pediment end of this temple. What matters under these conditions the very slight differences on the side surfaces of the columns in the direction of the length (of the temple); a single slight twist to right or left about the axis of the drum would lessen or increase this for the drums with diverging beds.

175 But to wish to see a structural reason in these curvatures, a rule for protection against the effects of earthquakes and the insecurity of the site, must be abandoned; only when constructed in the reverse direction, as in Egyptian foundation masonry, did the curved horizontal lines possess a meaning, although a rise of 3.15 inches for a span of 105 ft. is practically of no value.

An esthetical demand for the curvature did not exist, but in regard to its beauty of effect, one could hold a different opinion.

Krell¹⁴⁰ holds this opinion in his *Geschichte der Dorischen Styls*: "Not paralyzed, as some would say, but strengthened by the curved horizontal lines, which were moreover formed in the eye; the beauty of such an effect is questionable and might also be obtained by a nearer approach to the building".

Note 140. *Geschichte der Dorischen Styls, etc. Stuttgart, 1870.*

If the Greeks also possessed "more uncorrupted" eyes than we do (from the less frequent use of straight-edges, bevels and plumbs!), and saw everything straight as if curved, so that perhaps only curves appeared straight, the curvature was then certainly necessary, when a horizontal straight line was intended.

But if it be proved to us that all the grace and the eternal youth of Grecian architecture consisted in the distorted horizontal lines, which are moreover only to be recognized on a few monuments, we must then still gratefully reject this dogma.

The statement that the scamilli impares of Vitruvius were

transferred to the lowest drum of the columns of Grecian Doric temples, according to the explanations has but a limited value; as repeatedly proved in this case, the divergent beds of the drums are first arranged in accordance with the inclination of the columns inward and with the inclined floor of the portico.

Hoffer ¹⁴¹ believed that a fixed optical law must be accepted for the intended curvature, since he states that every long facade appears lower in accordance therewith, and the more so the longer it is, if one stands before its centre and looks toward both ends.

Note 141. Hoffer represents himself in his *Beitrag zur Konstruktionslehre der Griechischen Tempel* (Allg. Bauz. 1888. p. 371, 379, 387) as being the first, who has "given to his contemporaries a clear presentation of the system of construction of the Parthenon", and his technical explanations and statements are also mostly acceptable and correct. But his wedge, flying-buttresses, and curve theories afford reason for well grounded hesitation. The evidence, "that the system of curved lines on the Parthenon was actually based on the design and not on accidents" was not brought forward by him, while he neglects many things, like the architrave destroyed at the angles, the injuries in the substructure, the opening of the joints, etc., and the results of the explosion, while he did not take into consideration a sinking of the building, which was assumed or explained as such by him. He further states that the curve in the third and fourth courses from the top of the substructure loses itself, and that only with the upper angle of the uppermost step does "the complete curve of the construction" appear, to which all homologous lines of the entablature are then parallel, which again does not occur. For the courses turned inward, found by him, and their purpose, the drawing of the horizontals inward about .52 to .79 in., which commences on the capitals and increases up to the last line of the cornice, while the tympanum is again curved back from a true plane, Hoffer can give us no explanation, but these are most quickly accounted for by the deformations that here occurred.

According to him, but a few triglyphs stand exactly plumb;

the different pieces of the frieze were all fitted against each other at discretion, which was the less to be avoided, since almost every one had a different inclination to the vertical.

The deformation in the stylobate, which caused the cracks in the architrave and its changed position, must have likewise changed the position of the triglyphs and of the metopes, set with some play in the grooves.

Therefore these are the less suitable for proof, than the higher mutilated geison. Just as little can the present condition of the pediment induce me to accept, that its upper limiting lines were originally at a slight angle, and were later raised to the correct inclination.

If this inclination toward both sides were exhibited on the building itself, the effect on the observer must then be increased, since the building would appear longer to him than it is in reality. Whether the Greeks may have intended to increase the effect of their temples in this way must be left undecided.

Bötticher explains the curvature of the horizontals as ¹⁴⁶having arisen from the compression of the foundations, built of materials of inferior quality; Hoffer also calls attention to this fact, that on the eastern end (just where it rests on the natural rock and has the least depth of foundations!), it has sunk toward the north, and then raising this sinking again, assumes in his communication an entirely regular curve, which is to be considered an arc of a circle of 7087.84 ft. radius. He fixes the rise of this curve at 2.49 ins., and that on the Thesäon (pediment end) at 0.985 in.

But this raising of the angle and the regularity of the curve resulting therefrom are arbitrary and a concession to this theory, as he desires to assume and contrive something in its favor, and so provides himself with it, determined in a peculiar way. We are not authorized to make such corrections, concerning what we will characterize as defects in workmanship, and which are produced by deformations or sinkings.

Hoffer also adds to this and specifies, as did Penrose later, that not all "similar parts of the temple were made ent-

entirely alike with geometrical accuracy, and he even ascertained variations by no means unimportant, which yet made no disturbing impression on the general effect". Small defects and irregularities in the construction, with otherwise perfect jointing of the cut blocks, changes in the ground, deformations of violent character by explosion and bombardment, the decay of the upper surfaces, and the adhering together of the joints of the marble, are described by all investigators, and the condition of the monument resulting therefrom justifies the abandonment of the so subtle theory of curvature. At this time, when scarcely an angle on the building is uninjured, anyone would deceive himself, were he willing to fall into enthusiasm over the effect of curves, and to look for them in the elixir of life of Grecian architecture.

127. The slight negligencies in the execution, where the beads are in many places omitted above the triglyphs or metopes, or it was forgotten to carve them in finishing, must be mentioned. But these oversights could be repaired by painting.

116. Curves in Eggesta.

A curvature of the stylobate, especially on the sides, is also noticeable on the unfinished Temple in Eggesta, whose stylobate has never been dressed off, and rough pitched surfaces of very different dimensions appear on all ashlar. It is as readily visible as on the Parthenon, and especially if the north side be viewed under accidental light, so that the vertical surfaces of the steps of the stylobate are in half shade and the horizontal ones are in full sunlight. The curvature is here more irregular and greater than on Athenian buildings, and therefore we may still less assume a purpose here.

117. Curves in Pergamon.

An interesting communication is made in the work on Pergamon¹⁴², which we reproduce verbatim.

Note 142. *Altertümer von Pergamon*. Bd. II. *Das Heiligtum der Athena Folias Nikephorus*, p. 23. By R. Bohn. Berlin. 1885.

"Finally, another peculiarity should be mentioned, the curvature of the horizontal lines in the foundation. The southern front appears to be made entirely level, both the ashlar yet remaining as well as the preparation of the solid rock,

small variations up to .59 in. not being considered, and the courses of the northern front are too much broken to permit accurate observations. But the western front is otherwise; the increase in height here continues from both corners to the middle and is indded uniform in all courses. The maximum of this rise amounts of 2.16 ins. at the centre. That such a regular curve could not have been produced by an accidental sinking is clear. But since the opposite side is too much disconnected to show anything similar there, I can in nowise deduce from this single observation an intended curvature of the horizontals".

On this building, the substructure of the southern side is entirely horizontal, those of the northern and eastern sides can no longer be determined, and that of the western side is curved; horizontal construction and curvature therefore appear in the same structure.

We prefer to adopt Bohr's views, that it cannot here be a question of an intended curvature of horizontals, and just as little and for similar reasons, as on the Parthenon and The-seion. Defects in workmanship are here to be considered as proved by the existence of straight and curved substructures on the same work, and I cannot forbear to refer it to the well-known occurrence in practice, that in setting ash-lars from the two ends toward the middle, the workmen came out rather too high at the centre. In setting long courses of ash-lars, workmen are rather inclined to have the setting strips rise, that to slope downwards. These small additions for different ash-lars are finally added together and produce at the junction at the middle the excess over a true horizontal. Small variations of 1.97 ins. rise for a horizontal distance of 42.6 to 9865 ft. may well be passed by the superintendent of the work, as was assuredly done in Pergamon.

172. 118. Curves on the Temple in Corinth.

On the old Temple in Corinth (see description of its condition in Art. 151), a curvature was likewise discovered on its western side¹⁴³, which for a length of 65.7 ft. has a rise of .79 in. at the centre. A similar one is not stated for the long side. With this it should be noted, that an earthquake at an

early time threw down the temple and prostrated most of the massive columns. At the very least, 2400 years have elapsed since its erection, and "the earthquakes of the last 50 years have indeed not injured the temple, but the stylobate under most of the columns yet standing was found to be so ruined, that at a not distant time the complete overthrow of the temple (here should rather be said; of the 7 shafts of columns still standing with their half fallen and ruined architrave blocks) may be predicted with certainty".

Note 143. Mitt.d.Kais.Deutch. Archaeol. Inst. p.297-308. Athens. 1886-7.

Under these conditions the assumption is scarcely probable, that a deformation has not occurred here, and that in spite of these primitive conditions, an unusual accident may not have dislocated the stones and the solid rock by a small amount or have changed their position. But we will for the moment drop the possibility of defects in workmanship and ask whether the discoverer of the curvature really believes the foundation of a building to be actually unchangeable, if it stands on the solid rock? Why might not a sinking occur, when the lowest step of the temple is cut out of the solid rock? Mediaeval and even other architects frequently held the solid rock to be truly unreliable, and exactly to the fact that the Friedrichsbau in Heidelberg is founded on the solid rock is it to be ascribed, that the two principal facades have been considerably separated from each other by the widening of the cracks in the solid rock in consequence of admission of water (thus not at all by suddenly occurring natural accidents).

So much is now assured, and this will also be felt and must be conceded by the friends of intentional curvature, that in the present conditions of the temples considered, and after all accidents that have happened to them, especially at the Parthenon, where the stylobate ashlar were in part moved from their beds and the drums of the columns were forced outwards, the curves now existing are not at all any longer the original ones. By this fact is the basis withdrawn from many theories, and for anything further, we may satisfy ourselves by a reference to the worthlessness of horizontal curves to every prac-

practical architect in Maertens.

Note 144. Der Optische Masstab, etc. 2d edit. Berlin. 1884. In reference to curvatures, also see Durm, J. Die Propyläen von Athen. Zeit. f. Bild. Kunst. p. 294-296. 1884.

119. Scamilli Impares of Vitruvius.

In reports on the excavations in Sunion¹⁴⁵, Dörpfeld calls attention to the fact, that under two columns of the portico on the stylobate on the northern side wedge-shaped drums of columns of very slight height (1.97 to 0.0 ins.) were found to be placed, which were moreover not employed to give the axes of the columns an inclination inward, but to make the surface of contact of the column and stylobate horizontal. Further, this arrangement did not exist on the nine columns of the southern portico. But this leveling did not here occur in a plane parallel to the wall of the cella, in the manner elsewhere referred to Vitruvius, but in one perpendicular to this wall, which was necessary, since the pavement had a fall from the base of the wall to the face of the uppermost step of the stylobate.

Note 145. Mitt. d. Kais. D. Archaeol. Inst. Athens. 1884. p. 324-337.

The inclination of the pavement of the portico has also been proved elsewhere, and therefore this statement is not to be doubted. Dörpfeld sees in this arrangement the scamilli impares of Vitruvius, which interpretation will be readily accepted by every technician, although Vitruvius places it quite distinctly and clearly in the plane parallel to the line of the columns.

There were practically two methods of equalizing; either bearing surfaces were wrought on the stylobate ashlar, or the scamilli impares were formed on the lower drums of the columns by making their beds divergent. With these scamilli, the slope of the pavement of the portico and the oblique position of the columns could both be taken into account.

Koldewey¹⁴⁶ prefers to have discovered the scamilli impares for a temple in the Ionic style in Messa on two slabs supporting columns. He assumes, since this may have been the case in Priene, that also in Messa the pavement of the portico had no slope, in contrast with Attic buildings. Since the elevation

of the bearing surface above the upper surface of the stylobate is now unequal on all its sides, he infers from this that the front edge of the stylobate must have been "curved", and since these bearing surfaces in a plane through the centres of the columns parallel to the wall of the cella had the maxima and minima of the elevations, they thus corresponded "exactly to the previously unknown scamilli impares of Vitruvius". The two slabs supporting a column comprise an inner and an outer ashlar.

Note 146. Die Antike Baureste der Insel Lesbos. Berlin. 1890.

The Temple in question is built of trachyte-tufa and must have been a pseudoperipteral structure with 8×14 columns; but according to the report of the discovery¹⁴⁷, only the two stone slabs mentioned have been preserved. On these slabs are circular marks of location, not completely preserved for their entire perimeter, which rise to different heights above the injured ground of the slabs, almost flush with the ground,¹⁴⁸ or rise above it .04, .047, .118, .157, or in one place .59 in. . But one finds such appearances everywhere on antique ruins, which have their natural explanation in the fact, that the places covered by the shafts of the columns were protected, while the adjacent surfaces were injured by visitors, by cleaning, and still more by the effects of the weather. To the circumstance that protected and unprotected surfaces occur on the same stone and leave the corresponding marks, we owe the possibility of a reconstruction of so many antique monuments; it has occurred to no one till now, to accept these more or less visible or conceivable marks of location for the scamilli impares of Vitruvius.

Note 147. See page 49 of same work.

Note 148. See Plate 22 of same work.

The material is in the present case moreover so uncommonly slight in proportion to the whole, that it may at least appear very venturesome to base such distinctly expressed conclusions on this discovery.

180. 130. PolycPolychromy.

120. General.

The employment of polychromatic painting on the buildings of the ancient oriental nations, the Asiatics and Egyptians, is

well known, and proofs of this are still preserved on the external walls of the Temple on Philae and in the interior of the Temple at Denderah. Pleasure in color itself, which meets the inhabitant of the south in a thousand ways and everywhere in nature itself, may probably have been the principal inducement to transfer it to his structures. "The gay and many-colored flowers and fruits with which Nature adorns herself, appear to invite men to embellish themselves and all their belongings with as high colors as possible" (Goethe).

But the use of color decoration may also subserve practical purposes; building materials with small capacity for durability may thereby receive a protecting coating, and the external surfaces of materials not beautiful may be concealed by it.

The Greeks probably followed Egyptian customs and also Asiatic tastes, when they applied colors of equal intensity on their utensils and buildings as the highest decoration. It is to be ascribed to the perishableness and easy destructibility of those in the open air, that vestiges of them are now only preserved to us on entirely protected portions, often only on fragments covered by rubbish and earth, but these are again in such great abundance, that we are able to determine with almost complete certainty the design of the ornamentation, as well as its colors.

Moreover we also have evidence furnished by the ancient writers. Homer and Euripides speak of colored architecture. The walls of the Palace of Alcinous are described as being decorated by blue garlands; in the "Iphigenia", the golden frieze of the beautiful-columned temple is mentioned, etc.; and Vitruvius permits the triglyphs to be painted with sky-blue wax colors.

Further evidences are the slabs of Pentelican marble found in the right wing of the Propyleion at Athens on the 10th October, 1836, unfortunately broken and incomplete, on which were engraved the accounts for the finishing and ornamental works. We quote from these, for example:-- "To the same men who built the scaffolds for painting the lower portions beneath the roof, to Manis from Kollytos 4 oboluses; to the painters,--to him who painted the cymatium on the inner architrave 5 oboluses per ft. 149 166 leaves of gold purchased for gilding the shells---(eggs-and-

darts or heart-leaves are probably meant)----.

Note 149. One Attic foot equals 0.2957 m or about 11 $\frac{1}{4}$ ins. according to Dörpfeld in Mitt.d.Kais.D.Arch.Inst. Athens. 1882. p. 298.

According to Dörpfeld, Mitt.d.Kais.D.Arch.Inst. Atheo. Abth. Athens. 1890. p.170 et seq., the Attic foot actually employed, for example on the Eretheion, equaled from 0.326 to 0.328 m, or was about 12 $\frac{1}{4}$ ins.

Also in the year 1836 in excavations at the old Parthenon, numerous fragments of the frieze and main cornice of it were found, which were painted in colors and had retained a remarkable freshness and vividness in the earth, and which are still to be enjoyed.

But the best proofs of the original painting are still preserved to us on the Athenian monuments themselves. The Theseion, Parthenon and Propyleion exhibit sufficient vestiges; on numerous interesting architectural fragments of marble or of porous stone coated with stucco, and which are collected in the Museum at Athens, the complete painting is still perceptible. But one should no longer desire to seek for painting on the large surfaces of the columns, the external portions of the entablature, /8/, and the cella walls of marble monuments; for the surface of the marble is corroded on those parts exposed to wind and weather; hence a protecting color must have previously disappeared before the surface of the marble could have been attacked. That the golden tone now partially covering the monuments, and which results from a lichen, could have once been exchanged for a coating of color is hard to understand. ^{150.}

Compare Dürm, J. Aus Attica. Zeit. Bauw. 1871. p.471, and the conclusions of Landerer and Faraday there stated; also Lepsius, R. Griechische Marmorstudien. p.18, 121. Berlin. 1890.

According to the latter, Fentelican marble is distinguished from other marbles by containing iron (Calcium .5600, Carbonic Acid .44002, and Iron Oxide .00122, making 100 per cent), while again that from the Temple on Cape Sunion by chemical analysis contains scarcely traces of iron in the interior of the stone.

The latter has remained snow-white; the marble of most monuments in Athens is on the southern side white, on the eastern and western sides golden to brown, and has become on the northern side grayish-white to blackish-gray. The beautiful golden-

brown patina must have been caused by the weathering of the external surface of the stone, so that the lime of the marble has been dissolved and removed by rain water, but the iron in the marble has been changed into brown iron (hydrated iron oxide), whose intense brown coloring also plainly appears in the presence of a very small quantity.

On the Olympeion, the yellowish-brown color has chiefly formed on the southern surfaces of the columns and architrave; on the other sides, the marble remains whiter, but is covered by numerous blackish-brown spots. On the Theseion and on the Parthenon, the northern sides have remained almost white, but are covered by spots, while especially the western sides are covered by the beautiful golden-brown patina.

These phenomena are not contested, and the cause why the northern sides of Athenian buildings are colored less brown remained for Lepsius to explain (p. 121); "it likewise depends upon the weather, the rain, and the heat of the sun". Golden colored pieces of marble were picked up on the Acropolis, and I had them examined some years since by Privy Councillor Knop at the Technical High School in Karlsruhe; the absence of iron in the stone was found, and the brown skin must be referred to the existence of a lichen.

Likewise the Sicilian monuments with the architecture of Pompeii, which certainly originated at a later era, still show remains or even complete painting.

It remains to be lamented that investigators in the last century have left us such scanty notes on that point, since they must have then seen much more than those born later.

Researches on this important part of Grecian architecture, the ornamental external decoration, first assumed a definite form in this century, and the first to bring forward the idea of an entire polychromy did not fail to meet with vehement opposition from artists and scholars. An embittered literary warfare arose for and against the external polychromatic decoration, and continued for many years as a result.

Hittorf made a statement in the year 1823-4 in regard to the Sicilian monuments, and in his magnificent work ¹⁵¹, he supplied the almost conclusive evidence for an entire polychromy. Mean-

Meanwhile the highly-gifted Semper¹⁵² also came out as a champion of the idea and contributed in text and drawings the points essential to a settlement of the controversy.

Note 151. L'Architecture Polychrome chez les Grecs. Paris. 1851.

Note 152. Der Stil in den Technischen und Tektonischen Künsten etc. Bd. I. Pls. 1, 2, 3, 6, 9. Munich. 1860-3.

French and English investigators like Desbuisson, Paccard, Burnouf, Penrose, etc., are also in favor of the complete painting.

Polychromy on Grecian architecture and sculpture is no longer a question today, to the earlier evidence¹⁵³ has new been added in the last decade. From the so-called Persian rubbish of the Acropolis in Athens has it come and now fills the Museum on the Acropolis, and other objects are in the Central Museum there.

Note 153. See the first edition of this volume, p. 118-20.

That portion of this was made known in the most beautiful and complete manner in the magnificent German work "Antike Denkmäler",
/82, published by the Kais. D. Arch. Inst. Bd. 1. Berlin. 1890. Pls. 3, 18, 19, 29, 30, 38, 39, which are excellent reproductions of the originals, painted bands, draped statues, etc., where the material with its border strips is painted in a delicate manner, together with cymatiums, Ionic and Doric-like capitals of stelae with their colored anthemions, fret patterns, scale and foliage ornamentation.

But the most wonderful and attractive example is preserved on the so-called Macedonian royal sarcophagus, which also decides that marble works of the very highest rank could not dispense with color.¹⁵⁴

Note 154. Compare Durm, J. Die Makedonischen Königssarkophage. Cent.d.Bauw. 1890. p. 329-332. Also Hamdi and Th. Reinach. La Necropole de Saida. Paris. 1891.

The use of materials of different kinds and colors on similar works (architecture and sculpture) and also earlier produced polychrome, and the highest works of Grecian sculpture are executed in this way. The chryselephantine statues shone in magnificent golden draperies, which in turn were covered with painting or enamelled ornaments (compare the statue of Zeus at Olympia); the naked portions gleamed with the dead lustre of the probably slightly corroded ivory (which indeed of itself acquired a

color in time, similar to the color of the skin of the inhabitants of southern countries, the German red cheeks not being typical of them), the fire of the eye was produced by precious stones set in the cavities for the eyes. (Compare description of the Minerva at Megara, the Statue found at Ostia in 1797, the solid eyes of the Elgin fragments of the Athene on the pediment of the Parthenon, and statues and busts in the Vatican, one of which even has inserted silver eye-lashes).

The use of mabble of different colors for statues was also frequently attempted and executed with success, being thus a monumental polychromy, that was in the late period compelled to yield place to the commencing perishable work executed with the pencil, and indicates the desire to always see sculpture colored. A similar procedure is to likewise be recorded in architecture. (Also in this respect compare the terra cottas).

To the critics who approach these facts with conceptions of beauty and taste, I might quote Reber's words used on another occasion, that "our vagrant esthetic feeling no longer accords with much that Greek taste liked and approved, but the criterion of feeling is generally most fallacious in questions pertaining to the History of Art".

121. Colors.

The colors employed by the Greeks in their polychromy were not numerous, and were usually placed beside each other unbroken; only the so-called full colors, blue, red, green, yellow, and gold, with brown and black on terra cottas, are used on surfaces and ornaments; pink, pale green, and violet, on draperies of statues; these are sometimes laid on thickly, and are sometimes treated as transparent coatings or like lapis-lazuli.

Besides the triglyphs, the colored decorations of the other portions of the architecture are so small and delicate, that at the height they are placed, they would rarely be effective, unless painted in full colors. This circumstance is not sufficiently appreciated by those, who attack the hardness of the tone; they were also softened by distance and location.

183. 122. Technics.

The earliest monuments were built of porous limestone, and others were of tufaceous trachyte, like the monuments in Assos,

Pergamon, those in Sicily (Selinus and Akragas), as shown by the Temple on Egina and the remains of the old Temple on the Acropolis of Athens. The structure of this material did not permit the production of a close and smooth surface, and made the application of painting directly to the stone impossible. For this purpose, the stone had first to be coated with a ground for the painting, which consisted of a fine white stucco adhering excellently to the porous stone surface, so that specimens of it are still preserved in spite of weather and time. But with all the excellence of this coating, reparations of this stucco coating must have still been necessary from time to time. Hence as a result, men sought a better material, that did not require this preparation and was not exposed to these disadvantages, and in the best period employed in Asia Minor and in Attica the crystalline white limestone marble instead of the porous conglomerate, shelly, or coarse limestone. For this, a special preparation of the surface by a stucco ground for receiving painting was no longer necessary; this could be applied directly on the smoothly dressed marble, and this was probably a principal reason why no more costly material was retained and sought, though harder to work and more durable.

As the most costly material, gold, must disappear beneath painting or enamelling, still more readily is one pleased to have white marble covered by color, since it merely replaces stucco in a superior manner.

The application of colors to the stucco ground could be directly made while wet or after drying; the marble surfaces exhibit special preparation therefor. The parts coated with transparent colors (this could not be shown earlier), such as columns, architraves, and walls, were carefully dressed smooth, as well as the delicate members of the decorative architectural portions. The joints on columns and walls, architraves and cornices, were not intended to be visible; they were therefore so carefully made, that they are often scarcely perceptible to the eye; hence a decoration of them by color never occurs on Doric temples.

The gilded portions are characterized by a peculiar smoothness of the surface. In many cases, and this must be the most ancient procedure, the ornamental design was engraved on the

marble, i.e., its outlines were incised and then filled with color; (fragments of this kind are in the Museum on the Acropolis in Athens); in other cases, the ornament was lightly sketched with the point, the ground being scraped or made somewhat rough, so that the color would adhere better; in still others, the decoration was done directly on the smooth stone with the pencil without previously sketching the form (Compare fragments of both kinds on the Acropolis in Athens). The separate ornaments were later entirely worked in relief and also painted in addition (compare internal capitals of the Propyleion in Athens), which was yet later succeeded by works in marbles of different colors. The blue and green colors covered the marble to a thickness of .039 to 0.59 inch and were prepared with wax (as for example, the remains of the cornices of the Propyleion and parts of other buildings at Athens show) and had no very firm hold on the marble surface. (After scaling off, the blue or green left hardly any perceptible
 184 vestiges of color on the marble, while the stains of red penetrated deeply and are scarcely to be removed; compare in this respect the various remains of cornices, as well as the figure in relief, the so-called Soldier of Marathon and other earlier similar sculptured or merely painted sepulchral stel-
 155 es in Athens.

Note 155. Compare Conze, A. Die Attische Grabreliefs etc. Pl. 2. Berlin. 1890.

May one now assume Grecian polychromy on the exterior of the temple to be based on Egyptian tradition, or consider it as an artistic expedient for heightening the effect of the sculpture and architecture and concealing the unworthiness of the materials, or should one make Architecture, Sculpture, and Painting equal to each other, and say that each one of these would be heightened by the others; still, so much is certain, that polychromy is felt as a need, to not weary the eyes by a too extended mass of white masonry, whose appearance would have been intolerable under the intense light of a clear sky and in the midst of a highly colored landscape.

The warm bright yellow tone that covered the stone temples of Sicily, whose smooth portions were coated with stucco, and which is also found on the cella wall of the Temple on Egina,

permits the conclusion that similar parts were toned in a like manner on marble buildings. "This general coloring could probably scarcely be a thick layer of encaustic colors, as in the case of ornaments, but merely a simple transparent coating, which made the tone of the marble uniform and deprived it of none of its natural beauty; it easily assimilated those plain portions of the architecture with the naked figures, whose flesh-colored tone was probably produced by a thin coating, so as not to be prejudicial to delicacy in the representation of the forms, while material objects like draperies, etc., were painted encaustically as described and still to be seen".

Moreover, the exposed surfaces of marble ashlar are never spotlessly white; it is often streaked with bluish or yellowish stripes, which become still more prominent in time and already produce in the vicinity a play of color on the surfaces. If these are rubbed smooth or polished, the colors laid on the latter and the gilding are so reflected, and the original "white" appears so strongly, that it is scarcely accepted as such by the eye (Compare in this respect Von Hansen's Academy in Athens).

123. The Painted Doric Temple.

If we place before our eyes an image of the painted Doric temple in accordance with the preceding, and based on what we have ourselves seen on authentic remains, the cella walls, columns, architraves and cornices then first shine with that beautiful clear orange-yellow tone, comparable to the color of the evening sky on the southern horizon at sunset, while the abacuses were decorated by a colored band (fret), the echinuses might have a band of anthemions, of scale patterns, or of leaves (while the projection and scale are not too large), and the annulets gleamed with red coloring.

Continuous scroll ornaments decorated the front surfaces of the architraves, or the rich movable ornamentation of the golden shields and golden inscriptions covered them, while we may conceive the under surfaces as being decorated by painted interlacings. Gilded drops hung from the narrow regula beneath the triglyphs, which were themselves ornamented by small green palm-leaves turned downward. The crowning head-bands were covered

covered by a delicately lined fret in red and green; the triglyphs had the full acute blue tone and shone afar. The figures on the interposed metopes had the natural colors on the naked parts and on the draperies; the ground from which they rose was a full brownish-red, harmonizing with the blue of the triglyphs.

The head-bands of both may have been decorated by upright anthemion ornaments or by an interlacing without marked direction; The beaded astraglas above gleamed with gold. The vertical band above the triglyph-frieze, produced by undercutting the cornice-slab, was decorated by a blue and yellow or golden fret pattern on a red ground; the mutules were covered by the same blue as the triglyphs and had golden or red drops. The intervening spaces and the undercut geison were vermilion red, the first being still more richly decorated by golden palm-ornaments. The ogee moulding above the geison had margined and recurved leaves colored green and red, and which also extended along the pediment beneath the cornice-slab. The statues of the pediment had their natural colors; their accessories and weapons gleamed in gold, and like the reliefs of the metopes, rose from a brownish-red ground. Golden anthemions adorned the cymatiums, with a fret or sea-wave on the band beneath them, with recurved heart-leaves on the small echinus moulding, margined and having midribs on a green ground.

Note 156. Compare the colored restoration of the pediment of the Parthenon in Durm's Constructive und Polychrome Details der Griechischen Baukunst. Pls. 9, 10, 12. Berlin. 1880.

The lions' heads of the cymatium, the acroteria ornaments and the antefixas, again shone in full colors or were entirely gilded, the covering and ridge tiles being decorated by colored leaves and anthemions.

The ceilings of the porticos had the same color as a ground tone as the walls; the borders of the coffers were separated by golden beaded astragals on a deep blue or green ground, the horizontal surfaces were covered by red fret patterns, the echinus mouldings forming the transition to the ground of the coffers were decorated by recurved colored leaves, eggs-and-darts or heart-leaves, the ground itself with golden stars on a blue ground.

The supporting beams were covered on their under surfaces by painted interlacings, the echinus mouldings at their sides having recurved colored leaves. The cornice which crowned the cella wall and also extended above the frieze was decorated above with recurved colored leaves, with a golden fret on its band and colored heart-leaves on the moulding beneath.

The figures on the frieze of the cella rose in their natural colors from a brownish-red, blue, or white background, as on the metopes and the tympanum.

If we cast a glance towards the pronaos, we find the columns treated like the external ones, the capitals of the antae being likewise ornamented by recurved colored leaves and golden annulets on a green ground.

The space between the columns of the pronaos was filled by gilded bronze grilles (wooden lattices are reported in Epidaur¹⁵⁷), which extended high up, and behind which gleamed vessels, goblets, cups, silver lamps, etc. But sculptured ornamentation was also not wanting here; the walls of the vestibule in the Sanctuary of Athene at Platea were decorated by two pictures painted by Polygnotos; in that at Delphi were inscribed maxims for the practical uses of human life, such as "Learn to know thyself", "In nothing, too much", etc. Pedestrian statues of bronze were in the vestibule of a Temple in Corinth, marble statues of Athene and of Hermes before the entrance of the Temple of Apollo at Thebes; at the entrance into the Parthenon was placed the Statue of Iphicrates; statues stood around the Temple in Hermione; the certainly Corinthian Temple of Zeus Olympios had the same ornamentation before its columns. In the centre of the rear wall of the pronaos rose the colossal perforated folding doors of the principal entrance, made of gilded bronze, or of wood inlaid with ivory¹⁵⁸, thus forming the last decoration of the pronaos and that first seen on entering the sacred cella.¹⁵⁹

Note 157. See Baunack. p. 81.

Note 158. See Baunack. p. 79.

Note 159. To the idea of a completely executed polychromy was formerly opposed that of Kugler (Denkm.d.Kunst. B. Pl.4.A. Stuttgart. 1851), a partial one with white walls, shafts of

columns and architraves. The first seemed too chalky to some; the yellow transparent tone of crayon work was recalled by the other. The natural material looks as white and uninteresting as paper, and the "Baphe" on the marble does not actually appear as yellow as the painted local tone, and in both is the primary law expressed, that the architectural members mentioned must have the greatest clearness on the building, it being immaterial whether they are made somewhat colder or warmer in coloring. The statements concerning the use of color on the smaller architectural members and ornaments are otherwise approximately the same on both sides; blue triglyphs and the metopes with red grounds from Selinus, blue mutules with golden drops and red bands.

The signification of the metope in stone construction as masonry between two holes for ends of beams has given occasion to assume the ground of the metope in the same tone as the wall of the cella. If it was adorned by figures and the latter were painted, and the blue of the triglyphs was light and delicately harmonized, yet little of this can be restored, since scarcely anything of the ground yet remains, and the colors of the figures were already effective by contrast with the blue of the triglyphs. The colored reliefs on the so-called Alexander Sarcophagus (Macedonian royal sarcophagus) rise from a light marble ground and are very effective, as well as effective in the entire harmony of colors. Here and there will the colored figure frieze on a light ground be again held together by the strong color tones on the cymas above and beneath.

The picture will always be less favorable in the way of color, when the metopes exhibit no ornamentation by figures, and it may sink to tastelessness then. If the triglyphs were then painted a very dark blue, as given by Fenger (Dorische Polychromie, etc. Berlin. 1886) and a similarly colored tympanum were placed above them, with a white local tone of the architecture in general, then Kugler's scheme becomes the full-sounding Renaissance decoration! As already stated, the decoration of the capitals by fret bands and foliage might well be retained for moderate dimensions of the capitals and steep forms of the echinus, or for greater projection thereof with anthemions (compare

Faestum), in the presence of Athenian steles, but this has not yet been shown by any remaining Doric stone capital, and therefore in all colored restorations, the foliage decoration must be taken as a possibility and not as a certainty, just like the red and blue "*passepoilirté*" annulets (See Fenger, Pls. 1, 2). Annulets painted entirely red are assumed, but neither on the Parthenon nor on the Temple on Egina.

Whatever may be indicated as probable for the ground of the figures of the metopes may also be assumed for the tympanum, since this is just as much inserted masonry as the ground of the metopes. Light metopes and light tympanum also produce harmony, but never light metopes with a tympanum wall painted blue or red. A colored ground for the figure friezes on the Parthenon and Theseion is not verified, but is probable, if the ground for the metopes was colored.

Further examples of colored architectural members are also found in Le Bas (Pl. 8; II-3, 4, 5, 6). Heydmann (*Zeit.f.Bild. Kunst.* 1887, p.285-6) justly remarks on Fenger's *Polychromie*:—"Such a polychromatic temple, --consider merely the interesting restoration of the Temple of Athena on Egina (Pl.1) or of the Parthenon,--- resembles a naked man, who has on a festal occasion placed a complete garland of bright flowers on his head".

d. Internal Decoration.

124. Ornamentation in Interior.

As the surfaces, members and ornaments on the exterior of the temple shone with magnificent colored decoration, this must then be continued and enhanced in the interior of the House of the Deity. The internal columns, architraves and cornices were therefore decorated with similar colors and by ornaments of like character as the external; but the walls were covered by paintings, as Pausanias describes in the Temple of Theseus at Athens, for example. According to the same authority, "the end wall opposite the doorway in the Temple of Zeus at Olympia was painted blue", while the other walls were decorated by paintings by Panämus.

125. The paintings on the rear wall of the Temple at Messene represented the kings of Messenia; in Pausanias' time, the paintings on the walls of the Sanctuary of Artemis at Oilantheia had disappeared in the lapse of time; but those in the Sanctuary of

Esculapius and in the certainly Ionic Erechtheion were still visible. Although no vestiges of these wall-paintings are now preserved, we still possess the definite evidence referred to.

Chapels are already mentioned in Athens with gilded ceilings and decoration by alabaster and by paintings; the splendor of the ceilings with their inlays of gold and ivory, their overlays of mosaics or of bronze plates with cast ornaments, has already been mentioned.

125. Statues of deities and Consecrated Gifts.

The ornamentation and splendor of the interior was completed and enhanced by the statues of the deities and the consecrated gifts. Bronze shields were suspended in the Temple of Artemis Euklea in Thebes, like shields and garlands in the Temple of Zeus at Olympia, and the Armor of Marpessa in Tegea.

The more delicate and richer gifts lay on tables; others were placed at the feet of the statue of the deity or between the columns. The Throne of King Arimnestus stood as a consecrated gift in the Temple of Zeus at Olympia; the bronze Horses of Kyniska and a bronze tripod were also placed there. Besides the ancient chryselephantine statues of Zeus, of Hera enthroned, of the Horae, and of the beautiful Hermes of Praxiteles, there stood in the Heraion at Olympia a bronze Aphrodite, the Chest of Gyges, of cedar wood with reliefs of gold and ivory, a bed ornamented with ivory, a discus, and a table for the garlands of victors. In Tegea were the fetters of the captive Lacedaemonians, the teeth and the suspended "hairless and rotten" skin of the Calydonian Boar. From Hadrian's time dated a peacock made of gold and gleaming stones in the Heraion near Mycenae, where the Shield of Euphorbus and the Bed of Hera were likewise to be seen, and the four golden horses with ivory hoofs, and the two Tritons, half made of gold and half of ivory, in a Temple at Corinth.

Smaller sculptured images were even suspended from the ceiling, as in the Temple of Asklepios at Sicyon; the Stymphalian birds, made of wood or plaster (therefore also being painted) since Pausanias could not determine the material), hung from the ceiling of the Temple at Mantinea; an egg surrounded by bands (Leda's egg) was suspended from the ceiling in the Temple of Hilaira and

Phoebe at Sparta.

The temple with its consecrated art works thus appeared to be a museum, created by the piety of the people.

126. Internal Decoration.

Interesting information is given concerning the treatment of the interior of the temple by the "Delian inscriptions" made known and interpreted by Homolle¹⁶⁰. They first concern the preservation of the temple vessels (repairs of vases and kettles, the soldering of an ear on a silver cup, beakers, bowls, etc.), the purchase of a table for the Hieropois, several keys for the temple doors, then the insignia of a herald, pottery pitchers or bowls for containing silver or gold, ropes, hooks, together with appliances for preparing the statues of the gods for festivals, on which occasions the altars must be cleansed, the statues washed and touched up; old and new, wooden and stone statues must receive an external polish and coloring. They were first washed with a solution of saltpeter in water by a sponge, then rubbed with oil or wax mixed with a fragrant unguent (of roses) in order to perfume the material. For this "chosomesis" of the statue of Artemis was employed, for example:- 2 drachms for sponge, 4 obols for saltpeter, 3 obols for oil, 4 obols for rags and wax, and 5 drachms for perfume (together 11 drachms, 5 obols). Complete information concerning the internal arrangement of the temple will indeed hereafter be given by the further publication of the "Delian Inscriptions", which refer to the entire series of structures in which the temple treasure was arranged, and which state what was placed in the pronaos, what was in the cella, and what in the opisthodomus, what stood on the floor, hung on the wall, was preserved in chests, repositories, or separate receptacles. By these registers shall we first obtain a complete idea of the internal appointments of a Grecian temple..

Note 160. Bull. de Corr. Hellen. 1890. p. 462-511.

127. Vases of Consecrated Water.

The sacred furniture of the temple comprised the vases of purifying water placed in the pronaos (with which each visitor to the temple must be sprinkled, either by himself or by a priest, symbolizing that he now approached the altar of the

deity with a pure heart), and the small altars (Table of the Shewbread in the Jewish Temple) placed in the cella before the sacred image, intended for the bloodless offerings.

128. Altars.

The latter were mostly of stone (perhaps also of wood), circular, square, or octagonal in form, their sides decorated by ox-skulls, garlands of flowers, and sacrificial knives, as shown by finds at Athens and on Delos. Pausanias mentions a silver altar at Mycenae. Of the names used for altars, "hestia, eschara, bomos", the last is most common. In the earliest times, these were of the greatest simplicity, rudely coursed of stones or sods; in Theocritus (Td. 26, 3 et seq) women construct altars with brush and leaves, and according to Pausanias (IX, 3, 4), the Boeotians built a great altar of wood¹⁶¹.

Note 161. Compare Handb.d.Klass.Alter. by J.v.Müller. Half Bd. 14; Die Griechischen Sakralheiligthümer und das Bühnenwesen der Griechen und Römer. By F. Stengel and G.Oemichen. Munich. 1890. p.10-23 (Kultstätten), p.63-106 (Kultushandlungen). Further, E. Guhl and W. Kroner. Das Leben der Griechen und Römer. p. 57, Fig.42. Berlin. 1876. (Stuart found an octagonal altar at Athens). Lastly, J. Stuart and N. Revett, Antiquities of Athens. Part 27, Pl. 10(drawing of a round altar) and Part 28, Pl. 1(the three sides of a polygonal altar decorated by ox heads).

129. Statue of the Deity.

The statue of the deity, as the noblest and most sacred ornament, stood in a special cell (as in the ancient Sicilian temples, or the golden statue of Apollo at Delphi), or isolated in a space inclosed by low screens before the rear wall of the middle aisle, its colossal dimensions frequently reaching to the ceiling, gleaming with gold and no longer proportioned to the members and dimensions of the surrounding architecture.¹⁶² The statues of "associate" deities were placed around it in some temples, with the consecrated gifts beyond them.

Note 162. If according to Strabo, the statue of the deity at Olympia had been able to rise from its seat, this must have endangered the roof of the temple.

130. Statues.

Curtains usually concealed the costly statues of the deities, a woollen one of Assyrian weaving and dyed with Phoenician purple (which could be lowered to the floor) being before the chryselephantine statue of Zeus in Olympia. The treasures of /89, the State were also most safely deposited in the sacred place; The opisthodomē of the Parthenon was employed as a place of deposit; neither was the repose of the dead disturbed there, -- Antipoinos's daughter was interred in the interior of the Artemision at Thebes (although an exceptional case).

Although in ancient times the statues of the deities were frequently made of stone, wood, or metal, they became in the best period art works of the highest rank, Architecture and Sculpture contesting the prize in the temple. The chryselephantine statues of Phidias belong with the most magnificent sculptures. Standing on a high pedestal decorated by sculptures, the naked parts made of ivory, and the drapery of gold and extending to the feet, with the ivory Gorgon's head on her breast, the Nike in one hand and the spear in the other, with a shield at her feet and the Dragon (Erichthonius) beside the spear, Pallas Athene was represented in the Parthenon, the intrinsic value of the draperies being estimated at \$625,000. The Zeus at Olympia sat on a throne gleaming with gold, marble, ebony, and ivory, decorated by painted and sculptured figures and deities, his head surrounded by a garland of olive leaves, it also being made of gold and ivory, like the Athenian Pallas; on his right hand stood the Nike, likewise chryselephantine; he held in his left the golden sceptre with an eagle on its point; the golden sandals gleamed, as well as the heavy golden drapery, painted or enamelled with blossoming lilies and small figures. But even simpler figures in less costly materials also represented the deities, although frequently singularly inharmonious with our modern tastes.

Wooden statues were chiefly made in the ancient period, especially of ebony (Temple of Apollo at Megara), cypress, cedar, pear-wood (Heraion near Mycenae), oak, yew, and guaiacum-wood; only the statue of Hermes at Cyllene is stated to have been carved from thyon-wood (fir?). Ivory and wood were later used tog-

together, and the latter was decorated with gold and color, as shown by the Statue of Athene in Aegira, whose face, hands and feet were of ivory, the remainder being of painted and gilded wood.

Some statues were also entirely made of ivory, like the Statue of Aphrodite in Megara, for example; a combination of wood and marble was shown by the Pallas Chalinites at Corinth, whose body was of wood, while the face, hands and feet were of marble.

Note 163. Lucian, in his "Zeus Tragoides", permits Hermes to say of the gods: - "Thou seest how they are from Hellas, indeed graceful, beautiful, and artistically shaped, but all are of marble or bronze, only the most precious are of ivory, scarcely to be obtained with much gold, for color and polish; these are also internally made of wood and conceal in them great herds of mice duelling there".

Small figures of cedar wood inlaid with gold were mentioned in the Treasuries at Olympia, as well as a statue of Apollo in beech with gilded head, and a statue of gold and Parian marble in Mycenae. The statue of Zeus at Aegira was of Pentelican marble, and that of Pallas at Sparta was of bronze.

The chryselephantine work may extend back to about 580 B.C, and Dipönos and Scyllis were the earliest artists in this branch. Many statues were also covered with temporary decorations. A statue in a Temple in Sicyon wore a white woollen under garment, over it being a mantle; one in Aegion was covered by a transparent veil. The statues at other places were also decorated by garlands (in the Ino Sanctuary at Thalamea) or by myrtle twigs; (Statue of Hermes in the Erechtheion); the lower portion of the Statue in the Temple of Dionysios at Phigaleia was concealed by laurel and ivy leaves; so far as visible, it was painted with a bright vermilion color. Similar decoration by color was shown by the entirely gilded Statues of Dionysios in Corinth, whose faces were painted red.

A few eccentric statues of deities recall oriental influences, such as the three-eyed (one eye on the forehead) wooden Zeus in Larissa, and the Statue in the Sanctuary of Eurynome at Phigaleia, which was a woman to the hips, then a fish. Entirely different and opposed to the clear Greek nature is the descript-

description of the Statue in the cave of Demeter near Bassae; the wooden image is seated on a rock, has the form of a woman with the head and hair of a horse, wears a black under garment reaching to the toes, and has a dolphin on one hand, a dove sitting on the other.

131. Altars of Burnt Offering.

The altars for burnt offerings stood outside the temples and were originally mostly of square form, simple and without ornament. Frequently merely consisting of an elevation of the ground, of the heaped-up ashes of the sacrificed animals, or constructed of wood and unburnt bricks, they developed in the Hellenic period into great and artistic structures of stone, whose most beautiful example was perhaps the famous marble Altar at Pergamon. The Altar of Zeus rose on the east of the Pelopeion and in the centre of the Altis, and Pausanias states that it consisted of the first step (prothesis) 125 ft. in perimeter; that of the terrace above this was 32 ft., and the total height of the altar amounted to 22 ft. The animals were slaughtered on the Prothesis, their thighs were then carried to the top of the altar and were there burned. Stone steps on each side led up to the prothesis, with steps of ashes from thence to the top of the altar.

The arrangement and magnitude of the Altar in Olympia does not accord with its location as assumed for all temples alike, before the pediment end and the principal entrance to the Temple; the sacrificer must likewise have been unable to look towards the statue of the deity over the altar in consequence of its height of 22 ft., because he did not look towards the west.

132. Altar in Pergamon.

For the Altar in Pergamon, the mass of the masonry was a rectangle 114.8 by 124.64 ft., and was composed of the terrace, its external sides being decorated by sculptures. These rose above a base of moderate height and extended around three sides of the substructure for a length of 426.4 ft. The fourth side was occupied by a great flight of steps, the frieze being extended along their ends.

On its top was the terrace with the altar as its central point, enclosed by an Ionic portico 10.66 ft. high and raised on three

steps. The portico opened outwards, the solid rear wall being toward the altar.¹⁶⁴

Note 164. See *Centralblatt d. Bauwesen*. 1882, p. 107.

133. Altar of Hiero III in Syracuse.¹⁶⁵

The great Altar of Hiero Ist in Syracuse had the length of a stadium with corresponding height and width, according to Diodorus. Its ruins were discovered in 1839 and fix the length of the base with strongly projecting steps and mouldings at 650.75 ft., the breadth at 71.5 ft. on the north and 74.13 ft. on the south, with an existing height of 19.68 ft.

Note 165. See P. Lupus. *Die Stadt im Alterthum*. Authorized German edition of Camallari-Holm's *Typografia Archaeologica di Siracusa*. Strasburg. 1887. p. 42, 299.

191. These dimensions are somewhat inferior to those given by Diodorus. The ruinous condition of the colossal structure and of the small finds of few fragments of architecture and sculpture afford only very imperfect conclusions upon the nature of the structure. Fragments of a triglyph frieze were found, with those of a Doric cornice with lions' heads, of the capital of a pier, of a great eagle, and of caryatids.

134. Altar in Parion.

A larger altar still stands in Parion, measuring a stadium on each side.

Consecrated gifts, that could not be placed in the temple itself, were arranged within the sacred precinct surrounding the house of the deity. Here were placed statues beneath the open sky or under graceful canopies, the Heroa enclosed by stone walls and containing trees and statues, the little chapels built in the form of small temples, the treasuries, and the altars erected to different deities.

135. Treasuries.

The treasuries in the sacred precincts served to receive the consecrated gifts, which on account of their kind and nature could neither be placed in the temple nor in the open air. Those discovered in Olympia have the form of a small rectangular temple with a vestibule, which either opens as a distyle-in-antis or is treated as a prostyle structure, its style appearing to have always been the Doric.

Those most important architecturally are those of Sicyon, of Metapont, of Megara, and of Gelo. Everywhere on the architectural parts were found remains of color; cobalt blue triglyphs and mutules on the Treasury of Sicyon, on that of Megara being triglyphs and mutules of blue-black color, red bands, blue tympanum, terra cotta cymas and tiles, while these were of marble on the Treasury first mentioned.

The interesting edifice of Gelo consisted of a cella 43.2 ft. long and 35.59 ft. wide, before which was later built on the southern and longer side a Doric prostyle of 6 columns in front and 2 and 1/2 in depth. The columns were strongly diminished; the capitals had 4 incisions at the necking and the echinus had 4 annulets; the architrave was high in proportion to the triglyph frieze; regulas and mutules were without guttae. Here likewise belong the box-like terra cotta coverings, fastened to the geison with pegs.

136. Precincts of Temples.

The temple cannot be conceived as sufficiently rich and imposing with its surrounding sculptures and small sanctuaries. But the impression must have been enhanced in the highest degree when different temples and their accessories were crowded together on a relatively limited area, and where temple precincts were planned, as in Athens, Olympia, etc. In spite of their neglect and mutilation, the Athenian and the Olympian are still examples of noble effect, which we can again restore in fancy, rebuilding the ruins of the temples, animating the sanctuaries by statues and consecrated gifts, representing to ourselves the areas filled by the solemnly harmonizing multitude of the participants in the Pan-Athenian festival, under the splendor of a southern sky and before the background of a fascinatingly beautiful landscape.

The temple precinct in Olympia may have had a similar effect at the time of the great festival games (Fig. 132), since Pausanias commences the fifth book of his comprehensive notes on Elis with the proposition:— "Greece presents to the eye and ear many causes of astonishment, but the highest interest is connected with the sacred rites at Eleusis and the festival at Olympia"---. If not all works of sculpture and architecture had the uniformly

high finish, magnificence and beauty of execution found at Athens, yet the arrangement, grouping and magnitude of the art works placed in the midst of the shade-dispensing plane-trees of the Altis, of the venerable olive tree, with the surrounding temples, treasuries, gateways and porticoes, and the structures of the Gymnasion, the Hippodrome, the Theatre, etc., must have been powerfully attractive. Sacrifices could be made to the different deities at more than 30 altars; the number of the statues of the deities, of portrait statues of victors, and of consecrated gifts arranged in rows, were numberless. Great and prominent among these may have been the Zeus statue of the Eleians, 27 ft. high, the Hercules 10 cubits high, the beautiful Nike of Paenios of Mende, the Group of Horses with the Charioteers, the bronze Bulls, the bronze Chorus of Boys on the Wall of the Altis, the 12 bronze statues of Zeus in front of the terrace wall of the treasuries, and the bronze pillars with the inscribed treaties of peace. The Precinct of Epidauros illustrated in Fig. 133 may serve as an example of a smaller design. (Fig. 133).

e. Kinds of Temples.

137. Original Form of Temple.

Opinions concerning the original form of the temple are pretty strongly divergent. Some embrace the views developed by Semper, that a tent, a roof borne by separate supports, or a monumental canopy, first protected the statue of the deity, and that the developed cella was only constructed beneath this latter, -- placing the columnar structure as the original and leading idea. Others at first build for their deity a small and massive structure of stone, cover it with stone slabs or wooden beams, furnish it with doors and windows, then afterwards transform one wall into a colonnade, and later a second, afterwards placing a colonnade before one wall, then another before a second, finally surrounding the entire building with a single or partly double series of columns, it always becoming somewhat larger and richer, until it attains in the dipteral temple a maximum in columnar decoration. If the little antae-temples, the prostyle and amphiprostyle designs are the most ancient, this development would leave nothing further to be desired in

consistency and correctness.

But in accordance with Oriental traditions, the oldest temples exhibit the closed, 3-celled temple-structure with a peripteral colonnade arranged independently of the cella.

"It seems as if the Greeks considered the entire temple as an artificial protection for the sacred statue of the god. They beheld in the externally enclosing walls of the cella a "hedge" around the divine statue, a *sekos*, and gave to the space thus enclosed the name of "fold" (*sekos*). Like watchmen, the columns surround this (*periestasi peri ton sakon*) and are the principal supports of the protecting roof above".¹⁶⁷

Note 167. See Baunack, p. 64.

138. Rectangular Temples.

The ancient peripteral temples were dedicated each to a single deity and exhibit narrow and elongated cellas divided into three or two rooms in depth, which are connected together by wide doorways, -- thus as previously stated, being divided into a vestibule, a sacred, and a most sacred place. With but two rooms, the enclosed vestibule gives place to an open one; it becomes a *pronaos* or *prodomos*. Hence the rear apartment was later opened to become the *opisthodomos* or *posticum*. Only the larger central room of the original triple division remains an enclosed cella, having the open porticos before its two end walls.

Two of these forms of plan, the *naos* with a *pronaos*, or the *naos* with a *pronaos* and an *opisthodomos*, also occur in the little temples, as well as the very simple form of the cella enclosed by four walls.

The introduction of colonnades in the interior of the cella indeed occurred in order to render possible a greater width with a substantial covering thereof, and perhaps (not invariably), to obtain more space in an upper story for the exhibition of consecrated gifts, if the idea of thus producing a richer treatment of the interior in this manner was not the determining cause. To this 3-aisled inner apartment, which appears as the chief idea in all the later houses of the deity, apartments were further added, which did not serve for religious purposes, as for example at the Parthenon, where a special room was added

to the cella for the reception of the treasure of the State. (Fig. 134).

139. Circular Temples.

Besides rectangular cellas, circular ones are also found, for which we possess the evidence of ancient writers and actual proof in various existing remains. Thus a circular building with statues of Zeus and of Aphrodite stood in the Agora at Sparta; the Tholos near the Buleuterion at Athens, in which the Prytanes offered sacrifices, had this form; the circular form is also claimed for a few temples in Platea and in Delphi. Pausanias mentions another circular structure, the Philippeum erected in the Altis of Olympia by Philip of Macedon after the battle of Cheronea, and whose former existence was proved by the German excavations, but which indeed was not a temple, though it may be still regarded as analagous to an actual circular temple. Like the rectangular temple, the cella was surrounded by columns. Of the Tholos of Polykneitos in the Hieron of Asklepios near Epidaurus, merely the foundation walls and fragments of the entablature and columns were found, and not much more of the Arsinoeion on Samothrace.

140. Monopteral Temples.

For the monopteral, a peculiar form of temple given by Vitruvius, which merely consisted of an open colonnade with the entablature and roof resting thereon, the little circular temples of the Exedra of Herodes Atticus in Olympia affords an example, and the Okeagion Monument of Lysicrates at Athens is another, though not entirely analagous, as well as the Temple of Augustus on the Acropolis in Athens and the Julii Monument near St. Remy.

141. Double Temples.

But in certain cases, the temple also had the purpose of serving as a place for the worship of two deities; a separate room was then required for each. The cella was accordingly divided, and the double temple originated, the "Naos diplous."

Its cella could then either be divided by a longitudinal wall in accordance with Egyptian models, it might be divided in depth by a transverse wall, or its height might be divided into two stories by a beam ceiling. The last was the case in the Temple

of the Armed Aphrodite in Sparta mentioned by Pausanias; "the Temple had an upper story, dedicated to Morphe". No example of a division lengthwise remain. A division in depth is claimed by the Temple at Mantinea, dedicated to Ares and Aphrodite; the entrance to the cella of Ares was at the eastern end and that to the cella of Aphrodite at the western. The division at Sicyon was similar, except that a single doorway led to both cellas there; "in the front room was the Statue of Hyponos and in the rear one that of Apollo".

The finest and also the most complex example of a temple, which was dedicated to several deities, is the Erechtheion standing on the Acropolis of Athens (Fig. 134).

142. Telesterias.

It has already been shown in Chapter 1 that the temples were not intended to receive great multitudes of men, or for holding great festal assemblies therein, -- they were the seats and dwellings of the deities; the greater festival solemnities occurred ~~outside~~ them.

An exception is made in the buildings intended for the celebration of the mysteries, the consecrated temples (Telesteria or Megara), in which a large multitude of men were found engaged in a common act.

We have definite knowledge only of the single one at Eleusis, which dates from the era of Pericles; the cella forms a square apartment with a side 177.12 ft. long, which was divided into 8 aisles by 7 rows of columns; a series of steps extended along the walls of the cella in the outer aisle, interrupted in 6 places by passages. ¹⁶⁸ An external portico of 12 columns was placed on one side of the cella.

Note 168. See ground plan in Praktika tes archaiol. etairais. Athens, 1888, as well as Plate 1, Bericht von Dörpfeld. Fig. 134.

We should be compelled to abandon the previous basis of tradition and of fact in our considerations and trust to imagination, if we would finally busy ourselves with the critical examination of the various suggested "primitive forms of temples". It is indeed not impossible that between the heroic period and about 600 B.C., a special kind of temple may have existed, clearly worked out esthetically, and that those known to us (which we are other-

wise accustomed to consider as an image of perfection). are merely imperfect or misunderstood imitations of these; for not everything in them will fit certain established systems and theories. Neither shall we disparage the merit of such theoretical considerations, but must esteem them as hypotheses, and to advocate or controvert them being outside of our problem.

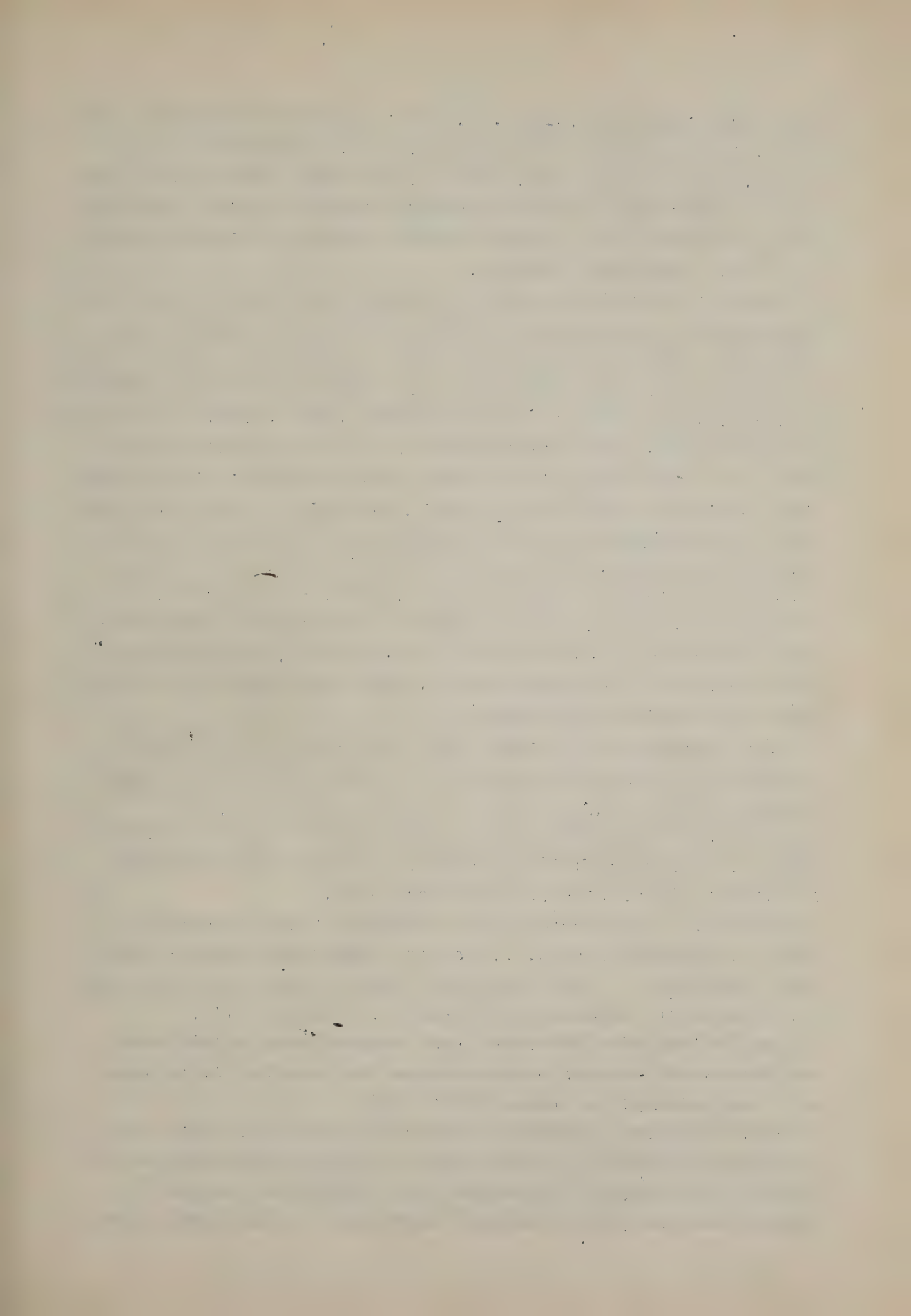
f. Lighting of Temple Cella.

143. General.

We see the interiors of Egyptian and Asian temples richly ornamented by colored decorations, sculptured ornament and costly furniture, without meeting with special arrangements for closely observing all these splendors by sunlight. The rooms, especially that one regarded as most sacred and most important, were withdrawn from all daylight.

Artificial lighting was better suited to the spirit of a religious faith, in which so much was based on magnificence and pageantry. The exclusion or the softening of the daylight in the interiors of religious buildings has been retained in the entire South until the present day, and it has been transferred to the modern Christian-Catholic and Jewish Houses of God. No visitor can suppress a certain spell in these dimly or artificially lighted interiors, which affects his spirit; a feeling of consecration, of community, and of reflection is aroused and maintained by entering therein.

Grecian architects and priests also had a similar aim, when they suppressed the placing of windows in the cella and only admitted light through the great doorways, which, as already stated, furnished a more scanty lighting. In spite of all this, it is not sufficient for the modern or Northern man; his antique deity requires more light! Since no windows in Doric temple cellas are preserved, and the primitive temple with metope windows can scarcely thought to have existed actually, a skylight must then light the house of the deity, like a modern museum hall, which men chiefly visit for the purpose of critical and artistic studies for their instruction, but not to produce in themselves a thoughtful frame of mind. The evidence of Vitruvius is also appealed to, who calmly states that no temple in Rome had a skylight, but prefers to learn from tradition



that such existed at Athens. No other writer in antiquity alludes to such a peculiar arrangement; by the statements of all others, the contrary custom must be accepted. Every single passage of classical literature bearing directly on this arrangement has always had to suffer serious attacks of investigators.

144. Hypaethral Temples.

Temples with such openings in the roof and ceiling are termed "hypaethral". The passage of Vitruvius relating thereto says: (III, I, 8): "Yet the hypaethral temple is decastyle, both in the vestibule and in the posticum. It is otherwise entirely similar to the dipteral temple; but has columns above columns in the interior standing free from the walls, so that one may pass around, as in the aisles of the court with porticos; but the central portion is under the open sky and without a roof; on each side is an entrance into the vestibule and the rear apartment with folding doors. An example thereof is not found in Rome, but in the octastyle Olympeion at Athens". ----(I, II, 5). "Structures are to be built under the open sky and open overhead, dedicated to Jupiter with his lightning, to Heaven, to the Sun-god and the Moon-goddess, whose forms and acts we now behold in open and clear space".

A few passages in Plutarch, Ovid, and Varro, are evidently tortured by various interpreters, or they are torn from their context, in order to be used for one or another opinion. Statements of Pausanias, that he saw various temples without roofs, for which condition he usually assigns an unfinished or ruinous state, have no importance here.

Note 169. The opposed views culminate in two treatises:-
Ross, L. Hellenika. Heft. 1. No more Hypaethral Temple! Halle, 1846. Bötticher, K. Der Hypaethral Temple proved against Prof-Dr. Ross by the evidence of Vitruvius. Potsdam, 1847.

Some declare that Bötticher has incontestably established the hypaethral temple; others esteem his treatise to be merely a weak attempt to oppose Ross' views.

Hence Vitruvius' entirely uncovered central aisle will suit the smallest number; to know that the chryselephantine statue and the treasures of the temple, were exposed to the heat of the sun and the rain of winter, must then be considered. Hence,

but a part is taken instead of the whole, and at a proper distance from the statue of the deity, a small skylight is constructed, which can be readily closed when required. Others close the opening with brightly colored tapestry, such as the Romans used in theatres and amphitheatres. Quatremere de Quincy vaults the ceiling of the temple and furnishes it ⁴²⁵with openings for light and ventilation, etc. (Dormer windows). Cockerell even makes the little temples on Egina and at Phigaleia hypaethral, and in his restoration of the Temple at Phigaleia, he covers the middle aisle with a segmental tunnel vault, which is furnished with a skylight like that in the Bracchio Nuovo. But Chipiez presented a prettier solution in past years and one not made without artistic taste, but which does not at all correspond to the requirements of Vitruvius, since both side aisles are lighted, and the ceiling of the middle aisle is closed. (See Fig. 33. ¹⁷⁰)

Note 170. For the different hypaethral arrangements proposed, see the next volume of this Handbuch (Roman), Figs. 288 to 291, Arts. 319 to 321, pages 313 to 318.

Since the evidence of Vitruvius, which is moreover not free from contradictions, rests on too insecure a basis, or is only acceptable if we regard the main aisle as an uncovered court before a shrine in which the statue of the deity was placed for protection, as appears to have been the case in the great temples at Selinus or at Miletus; since moreover we possess no other accounts, and the existing restorations by descriptions and drawings are inadmissible, and all beginning points relating thereto are wanting on the monuments, -- we will therefore believe that what was customary at Rome was likewise usual in Greece. Not a single one of the numerous representations of ancient temples on slabs of marble and on coins exhibits an opening in the roof. It is also not to be assumed that esthetic considerations were entirely neglected, that the interior of a house of the deity with its costly treasures and sculptures ¹⁷⁹was "exposed to the snow and rainfall from the open sky, as well as to owls and bats". Neither has any arrangement of the pavement of any temple been found, corresponding to an opening in the roof, for carrying off the water that would enter there;

no impluvium and no drains for water are yet known, and it is probable that none will ever be. Nothing authorizes the assumption that the Parthenon at Athens, the Temple of Poseidon at Paestum, the Temple of Athene on Egina, etc., were hypaethral, and there is no evidence for this. When the Christians transformed the Parthenon into a church, they indeed found the lighting through the eastern doorway sufficient; according to the evidence of Wheeler and Spon (1676), they added no new openings for light, "they permitted the light to enter from the east, and this is still the entire lighting." -- The Temple was externally covered with large slabs of stone, some of which have fallen and are to be seen in the mosque". Other authorities contradict this.¹⁷¹

Note 171. See Mitth. d. Kais. Deutsch. Arch. Inst. Abth. Athen. Vol. II. p. 42.

The lighting may certainly not have been as abundant as in the native churches of the famous travelers, a circumstance that we Northerners, accustomed to well lighted interiors (and who desire to read in churches), also meet with in the Christian churches of Italy, (see San Miniato, Orvieto, etc, where instead of plates of glass, thin and transparent slabs of marble partially fill the openings for light, as well as almost all Early Christian churches); They likewise state in this sense; "From the vestibule, we entered the temple through a lofty doorway placed in the middle of the front end; yet neither my companion nor myself were so greatly astonished by the darkness prevailing therein, as was Mr. Guilliter, since our observations in other pagan temples had already accustomed us thereto". And yet those Christians considered it proper to decorate the walls of the but dimly lighted interior by paintings, although but half its lofty entrance doorway was probably used for the admission of light, the other half being closed by wooden folding doors (so that only one-half as much light could enter the interior as in ancient times), also to place in the choir a canopy (heaven) supported by 4 prophyry columns, and to ornament the ceiling over the altar in the choir by a representation of the Holy Virgin in mosaic work.

Even in the Renaissance period did men become as solicitous



in regard to the light in the decoration of ecclesiastical or secular interiors as now, and which, if too abundant, may easily make an interior common and valueless.

It is unnecessary in the South to admit heat and light rays of the sun into the interior of the building in masses, as in the North; precautions are taken to keep them out as much as possible, as proved in all its buildings from the earliest antiquity until the modern era.¹⁷²

Note 172. Choisy expresses himself in this manner in *Etudes Epig. sur l' Arch. Grecque; III Etude. L'Erectheum, etc. Paris. 1884. p. 152.* "Under the luminous sky of Athens, the doorway sufficed in case of need to light the cella". --- Dieulafoy continues:-- "For more than a century, architects and archaeologists have continually proposed hypothetical restorations of the lighting of Greek temples, especially of the Parthenon. Solutions succeed each other, but not even the most ingenious are free from just criticism. One need not be surprised; I am convinced that the cella of the Parthenon received light only through the entrance doorway.

The furthest columns were scarcely visible and seemed to flee into the darkness, the dimensions of the hall were exaggerated in the dim light; the Statue of Minerva, made of precious metals and ivory, alone attracted the rays of light scattered through the air in the temple, and became animated by a mystic life by their reflections. Who knows whether, under the shining sky of Attica, the light passing through the doorway may not have already been too bright, and whether the Greeks did not modify it by a grille placed in the upper part of the opening.

Every visitor to the East and to Greece knows how difficult it is to produce comparative darkness in the daytime in those strongly lighted countries; a badly fitted door or a slight crack in the walls suffices to light the interiors of the largest rooms.

Moreover, without mentioning paintings, that are faded by too bright light, all exposed objects in the temple would gain by protection from light and dust.

The very conclusive example of the Apadana (Persepolis)

with 100 columns furnishes us with indisputable proof of the uselessness of windows in Grecian temples. The volume of the interior of the cella of the Parthenon was nearly 2,472,092 cubic feet; the room was lighted by an opening of 538.2 sq. feet, which gives .007 as the ratio of the opening to the volume."

Pausanias (V, 20) says in a well known passage relating to the soldier found between the roof and ceiling of the Heraion: "After his death there, neither the heat of summer nor the frost of winter could injure the corpse, since it was protected on all sides". This would not have been the case under the hypaethral arrangement.

Architects and archaeologists, who are still attached to the theory of the hypaethral temple, must take these into account.

200. g. Periods of the Style and their Monuments.

145. Periods.

Semper distinguishes six principal periods in the history of the Doric style, which are chronologically arranged and include:-

- a. The Protodoric.
- b. The earliest lax Archaic. (7 th century B.C).
- c. The second severe Archaic Doric. (6 th century, Era of the Tyrants).
- d. The third developed Doric. (5 th century.)
- e. The Attic Doric. (5 th century, Era of Pericles).
- f. The late Doric. (4 th century and later, Period of Alexander to Hadrian).

This subdivision has already been adopted in numerous places and will be followed here, except that instead of "Protodoric", we will use Early Doric, although it cannot be denied that with this, one may frequently fall into insoluble historical contradictions of many kinds.

1). The Early Doric Style.

146. Characteristics.

There can be no doubt that in the course of the 7 th century, from which the veil has not yet been completely lifted, columnar construction had already assumed an artistic form, that the echinus capital, this simplest transitional form for receiving the load, that the triply divided entablature had al-

already been fixed before the Doric period, and also that their ornaments had already been elaborated to a certain degree.

This style of architecture had indeed not then assumed a fixed form: definite rules of proportion were scarcely in use; foreign elements were still mingled with those, which later separated themselves as especially Doric; and it remained until the next period to perform the necessary sifting and refining by passing through transitional steps of many kinds.

Here are especially to be placed those monuments belonging to wooden architecture or to that of mixed wood and stone, in which, for example, the foundations, substructure and steps were of ashlars, the walls of the cells were of unburnt bricks, the antae were of wood or even of stone, the entablature (frieze, architrave and cornice) were still entirely constructed of wood, retaining characteristic ornamentation, later transferred to stone construction: the roof was treated as a segmental arched terrace-roof of clay and straw, or was even a roof with rafters.

The imported idea of the Egyptian stone column influenced the form of the column; the characteristic form of the capital was decided by the corresponding attempts at the Lions' Gate and the Treasury of Atreus at Mycenae, and on Cypriote buildings. Motives for the oldest forms of capitals are further given by the vase paintings, which frequently exhibit the architecture of an earlier time, than that of the ceramic objects on which these are represented, as well as the stele caps found in the so-called Persian ruins on the Acropolis of Athens.

No assured beginning points for the art forms of these buildings now remain; we can only conjecture them from the works of the later architecture in stone. We must assume that the regulae and drops of the architrave, that the triglyph-frieze and the cornice with its mutules and drop earlier had a definite purpose, or resulted from a structural form.

147. Monuments.

Only the following monuments are therefore to be considered here: the Fountain-Sanctuary in Gela, the Temple in Assos, with its very archaic sculptures on the architrave and on the metopes, with the absence of any characteristic decorative members, and the Heraion in Olympia.

1. The ancient Fountain-Sanctuary at Cadacchio on Corfu is preserved for us in abundant fragments (at the discovery of which were found bricks with ancient inscriptions, scarabei, etc.), with 6 columns in front and originally 12 along the sides. A portion of the cella walls, now scarcely 3.28 ft. high, and shafts of 13 columns were found. The columns are proportionally slender, are surrounded by 20 extremely shallow flutes, are moderately diminished with straight sides, and have intervals wide in proportion to the diameters, while the distance from centre of columns is only 7.48 ft., and but 6.89 ft. next the angle column.

The entablature exhibits foreign members; the frieze is without triglyphs and the pediment is high; the decoration of the different architectural members is in relief. A single capital has a circle of leaves at its junction with the shaft and a strongly swelled echinus. The entire facade in outline gives an impression of breadth and heaviness. ¹⁷³

Note 173. See Cockerell, Kinnard, Donaldson, Jenkins, and Railton. Antig. of Athens. German edit. Lief. III, pls. 4-8. Leipzig and Darmstadt. (Enga Edit. in Arch. Library).

2. The Temple in Assos on the Aeolic coast possesses a pronounced archaic character, and according to the statements of Texier, it has an increased arrangement of steps on the facade and 6 x 13 columns; these are 7.17 and 7.97 ft. between centres, are 15.42 ft. high, and are surrounded by 16 flutes. The capital is like that at Cadacchio. The architrave is decorated by a continuous series of figures, whose character indicates a high antiquity and exhibits in treatment an alliance with the sculptures of Etruscan tombs. (Corneto). The regulae are without drops, the triglyphs are low, the metopes are ornamented by similar archaic figure reliefs, like those on the architrave; the mutules of the cornice are likewise without drops; holes in the cornice are filled with cast lead and indicate a cyma of metal or of terra cotta. The material used consists of a volcanic stone, trachyte, of a dark color, which was indeed coated with stucco. The American excavations in Assos in 1881 substantiate the statements of Texier, particularly in regard to the number of columns, and approximately so, as to their

height (15.42 instead of 15.68 ft.); but the existence of an entasis is denied. It is proved that the columns of the pronaos had 18 flutes, and those of the portico 16. Moreover, no column was then found in its place, nor were the ashlar of the cella; even the upper steps on the east and west sides are wanting.

In opposition to Texier's plan, the temple is now represented as a plain antae-temple with a peripteral colonnade (allied to the middle city Temple in Selinus), and measuring on the upper step 46.02 ft. wide and 99.48 ft. long. The blocks of the lower step still retain the setting bosses, the cornice blocks have U-shaped grooves for the hoisting rope, as well as iron cramp bonds; the drums of the columns and the abutting surfaces of the ashlar have closely dressed edges. Both the plain and the sculptured metopes were slipped into grooves in the triglyphs. The roof tiles were burnt terra cotta. The recently discovered sculptures of the architrave are now deposited in the Museum at Constantinople. The early date formerly assigned to the temple (7th century B.C.) is now reduced by Clarke and it is referred to 479 B.C., an assumption in which I can by no means concur.¹⁷⁴

Note 174. See Clarke, J. T. Report on the Investigations at Assos. 1881 et seq. Boston. 1882. P. 215, pl. 8. Also:—Adler, F. Die Ausgrabungen in Assos. Cent. d. Bauw. 1883. p.67.

3. The Heraion in Olympia lays claim to a high antiquity, was erected by the inhabitants of Scillus in about the eighth year of the rule of Oxylos over Elis, and it is indeed the oldest remaining house of a deity in Greece, though only preserved in a few ruins rising above the soil.

The original building was founded about 1000 B. C. and must have suffered various works of restoration in the course of time, as may be concluded from the wooden columns in the opisthodom, mentioned by Pausanias, and the finds during the discovery of the remains of the temple. The temple was peripteral, with 6 × 16 columns, which rose from a stylobate of two steps; the cella was divided by internal rows of columns (only the marks of the location of these being found), and it was furnished with pronaos and posticum-in-antis; its dimensions are

61.50 by 164.08 ft. The diameters of the columns differ not less than 11 5/8 inches (3.28 to 4.23 ft.); the capitals exhibit all possible kinds of cymas; the shafts of the columns have 20 flutes, though a single one makes an exception with 16. The intervals between the axes exhibit strong differences, their average value being taken at 10.73 ft. The columns of unequal diameters stand on three sides tangent to the upper step, while on the fourth or north side, their centres lie in a straight line. As seldom occurs, the cella columns lie on the same transverse axis with the portico columns. The antae consist of separate projecting wooden pieces.

The striking thickness of the walls is also to be mentioned, whose lower courses were of ashlars and the upper were of sun-dried bricks, as well as the small width of the middle aisle (12.47 ft.), which exceeds the external intercolumniations by only about 4 inches, thus not even attaining the width of a common living room. The architrave and frieze were not found and may indeed have been of wood.

Under the eastern portico is only a sill instead of a foundation: towards the west, the foundation walls increase in depth to 8.53 ft. and in width to 12.074 ft. The site of the building is on the northeast on sand as hard as stone, and is on soft river sand on the west and southwest. The western and southwestern portions of the temple have settled considerably, a circumstance which must indeed be ascribed to the varied character of the site and the varying depths of the foundations.

The building material consists of a yellow limestone; a few columns were of a coarse shell-conglomerate; the stone masonry was covered with stucco, and the roof was covered with terra cotta tiles. The external appearance of the ruins recalls those of Sicilian temples.

2). Lax Archaic Style.

148. Characteristics.

The first epoch of the style of the historic period exhibits in its works a high crepidoma with a flight of steps in front, and a certain endeavor after colossalness in the building makes itself felt. The temple is divided in its depth into three distinct apartments, the pronaos of nearly square plan, the elonga-

elongated cella, and the short opisthodomē apartment with its somewhat raised floor, which received the statue of the deity.

The columns are strongly diminished, have an entasis, and are generally covered by 20 flutes; a single incision at the neck is customary, though the triple incision is already known. The capital is low, but projects strongly; a deep hollow at the neck; ing forms the transition to the shaft of the column from it; the plinth (abaous ?) is of massive form.

The front surface of the architrave lies in a vertical plane tangent to the upper circumference of the column; the architrave is higher than the frieze, and the entablature is on the whole heavy. The triglyphs are broad and low, the upper ends of the grooves are sometimes curved (pointed or ogee), sometimes treated with a weak or softened outline like a volute. The metopes have a head band and ornaments in relief, the latter often entirely or in part of marble. The geison is massive; the mutules over the metopes are only half as large as those over the triglyphs, and but 9 drops are suspended from them.

The cyma is generally high, frequently being merely a vertical band of terra cotta decorated by lions' heads. The pediment is still high; the ceiling of the portico commences at the upper edge of the frieze; the triglyphs are repeated across the end walls of the cella.

In the polychromatic coloring, besides the full colors of blue, yellow and red, there also occur green, black, and white, with yellowish and brownish to blackish tones on the terra cotta (tiles, antaefixes and cymas).

149. Monuments.

1. The Temple (D of Hittorf) in Selinus (Selinus founded in 628 from Megara Hyblea and forever destroyed by Hannibal Gisgon in 409) is a peripteral temple with 6×13 columns, those of the portico being strongly diminished and having 20 flutes, while those of the pronaos are smaller and have 16. The cella is divided into three parts, and it is without antae, but on the contrary, it has three-quarter columns attached to the projecting side walls of the pronaos; the opisthodomē is very deep. The capital is low and projects strongly, has a deep hollow, 4 annulets and a single incision at the necking. The architrave is a little



higher than the frieze; the middle blocks are 14.697 ft. long, the triglyphs are heavy and the metopes are narrow and without sculptures. The frieze of the cella is lower than that on the exterior. The drops on the regulas of the architrave hang free; half mutules only are above the metopes on the heavy and but slightly projecting geison. The triglyph-frieze also extends along the end walls of the cella. The temple stands on this side of Selinus on a plateau elevated 154.19 ft. above the level of the sea; its materials were obtained from the limestone quarry in the vicinity.

2. The second oldest Temple (C of Hittorf) in Selinus is a peripteral building with 6×17 columns, and with another row of columns interposed before the pronaos, and it stands on a substructure of 4 steps, which is changed into a flight of 9 steps at the entrance facade. The cella is without antae and is divided into three parts, a pronaos of small depth, an elongated central apartment, and a short opisthodomos. The columns are not all of equal diameter (6.381 to 5.810 ft.) and are not equally spaced; the larger ones are set on the ends. The shafts of the columns are monolithic and have 16 flutes; the capital projects strongly, is decorated by a hollow of no great depth, with 4 annulets and 3 incisions at the necking.

The upper member of the architrave is peculiar, being a round between two leaf-mouldings, with regulas from which drops hang free. The frieze is lower than the architrave, whose largest blocks measure 14.908 ft. in length; the triglyphs are broad, their grooves ending in ogee arches, the fillets have borders and their surfaces are curved forward at top, the surfaces of the metopes are deeply recessed within borders and are decorated by high reliefs in marble. The cornice is stumpy and massive; half mutule blocks only are above the metopes, their drops treated as tolerably long cylindrical pegs.

The limestone was covered with stucco; the remains of color still exist on the ruins in many places. Here likewise belong the painted terra cottas and rain spouts. The building was overthrown by an earthquake.

3. The Temple of the Lycian Apollo, called Chiesa di Sansone, at Metapontum. A hexastyle peripteral building located on a lev-

level plain, it has been entirely uncovered during recent years. The foundations were constructed of tufa blocks (measuring $2.10 \times 3.03 \times 1.28$ ft.) without mortar, carefully bedded in the scil. The stereobate must have consisted of 5 courses, as deduced from a still existing fragment of wall. No vestige of the steps or of the floor yet remains. The temple measured 135.87×73.8 ft. and 127.92×65.6 ft. on the upper step of the stylobate; on this 6 columns stood at each end and 12 on each side, which had a height of 18.37 ft. with a lower diameter of 4.46 ft. Besides 40 shafts of columns, 18 capitals were found, which measure 636 ft. across the abacus and have a diameter of 3.44 ft. at the necking member. Two rectangular bands border the echinus, from which a deeply undercut hollow extends to the shaft, which was decorated by 20 flutes.

Two fragments of the entablature were found, which are accepted as remains of triglyphs and are represented in Fig. 89, p. 117. Besides the remains of two lions' heads of Parian marble, which formerly ornamented the gutters of the roof, many terra cottas were found, such as antefixas, egg-and-dart mouldings, and lions' heads,-- six different kinds of the latter! To this temple likewise belonged the colored terra cotta boxes shown in Fig. 98 (p. 130). Lacava¹⁷⁵ remarks on this:-- "e nel quale si trova un chiodo di bronzo assai ben conservato, della lunghezza di centimetri 14, che dimostra il modo con cui le terrecotte si sospendevano all' cornice del tempio." A dedicatory inscription was found on the temple in the following words:-- "Apollonos Lych.eimi, Theageos Rod th(ema). The temple was probably thrown down in ruins by an earthquake.

Note 175. Topog. e Storia di Metaponto. Naples. 1891. p. 115, pls. V, VI. -- For foundations, see same work, pl. II; for the form of the capital, pl. III and pp. 70 - 81; also Sante Simone. Studi sugli avanzi di Metaponto. Bari. 1875.

4. The Tavola dei Palladini or the Tempio delle Colonne Palladini in Metapontum. A peripteral structure of 6×20 columns standing in the vicinity of the preceding building, of which $10 + 5 = 15$ columns with the corresponding architrave are preserved. The cella was composed of two rooms of unequal size, the front one measuring 37.0×20.66 ft. and the rear one being

12.73' x 20.66 ft. The columns were constructed with 4, 5, 6 or 7 drums, had a lower diameter of 3.61 ft. and stood 9.51 -- 9.54 -- 9.64 ft. between centres. The strongly diminished shafts were decorated by 20 flutes, and on their external surfaces were many remains of the ancient stucco coating. Two drawings of the have been published, one by the Duc de Luynes (1828), the other by Sante Simone (1875), but they do not agree,¹⁷⁶ and indeed neither is sufficiently accurate. Since the capitals were also coated with stucco, the form cut on the stone gives merely approximate information concerning the completed form of the capital.

Note 176. See Lacava. Pls. IX and X.

The northeast angle of the stylobate was found and it is composed of 6 courses, constructed of porous limestone ashlar, averaging 1.31' x 3.61' x 2.46 ft. At this temple were likewise found painted terra cottas, lions' heads, water-spouts, etc., similar to those of the Temple of the Lycian Apollo; hence both were coated with stucco, painted and ornamented with colored terra cottas.

5. The Temple of Demeter at Paestum (Posidonia, founded from Sybaris in 700 B. C., or in 600 B. C., according to other accounts, came under Roman rule in 273, and it was already under Augustus brought into bad repute and depopulated by the unhealthy air) is a peripteral structure of 6' x 18 columns on a sub-structure of 3 steps, which does not extend entirely around the building. The cella is divided into three parts in accordance with ancient custom, and it has its pronaos in the form of a tetraprostyle and 4 columns in depth, whose floor is raised in front by one step and in the middle by two other and wider ones, its columns have bases, to which correspond short portions of the cella walls with antae. A separate shrine for the statue of the deity was constructed against the rear wall of the cella; a doorway leads from the opisthodomos to the portico. The columns stand vertically, are strongly curved in outline, sack-like, with 24 flutes on their external surfaces. The echinus projects strongly, is decorated next the shaft by a small round instead of by annulets; the hollow has recurved leaves; the flutes end at top in curved form. The architrave, whose front surface coincides with a tangent to the upper circumference of

of the column, is almost of the same height as the frieze; the taenia and the regulas and drops are replaced by a specially designed cornice member, on which vestiges of leaves may still be recognized. The frieze consists of long slabs in which grooves are cut to receive the triglyphs; the latter are now wanting, having indeed fallen off, since the necessary support was withdrawn from them by the fall of the upper portions of the cornice. The triglyphs were narrow, the metopes without relief ornament, but with a head band (whose existence is by some denied in an incomprehensible way); in height, the cornice consists of two massive slabs, one above the other, and whose original form can no longer be recognized. After a comparison on the spot, I have no ground for accepting the existing publications as especially reliable, and must therefore disclaim any representation of the detail forms, which are no longer to be made out, as well as the assumption that half metopes were placed at the angles, which can no longer be determined, and whose former existence I may doubt. The sack-like, strongly curved columns with their greatly projecting decorated capitals, the heavy entablature (which goes into the height of the columns $2 \frac{1}{2}$ times), the high pediment, the heavy and even unrefined detail forms, permeated by foreign elements, the possible projection of the triglyphs in front of the surface of the architrave, which recalls the ancient rock-cut monuments of Lycia, permit the structure to appear as very ancient. (See Fig. 90, p. 118 and Fig. 135).

Reddish yellow tufaceous limestone, quarried in the vicinity, was employed for the building.

6. The so-called Basilica in Paestum, unique of its kind in plan, is a peripteral structure of 9×18 columns and exhibits forms allied to those of the Temple of Demeter; strongly diminished antae with peculiar strongly curved capitals form the ends of the side walls of the cella, whose adjacent parts still remain; the sack-like columns, which are here still more strongly diminished, the strongly projecting capital with a small round instead of the annulets, the hollow decorated by leaves, are also found here as well as there. In like manner, a crown-



crowning member lies above the architrave, cut as a separate course, its form no longer to be determined, and above it are some plain portions of the frieze.

A row of columns extends along the middle of the wide cella, "perhaps to support the roof, instead of the two rows of other temples", according to Semper.

Pausanias says of the Korkyrean Hall in Elis, that it was divided along in the middle by a wall, which supported the ridge; the columns placed along the central axis at Paestum may therefore have had the same purpose.

7. The Capital of the Memorial Column of Xenares, the Capital in the Anakten House in Tyrins, and Fragments of architectural members in the Persian Ruins at Athens.

3). Severe Archaic Doric Style.

150. Characteristics.

In the severe archaic style, the cella of the temple was retained in accordance with the ancient custom; on the other hand, the columns become straight and more slender with greater diminution, while the capitals again exhibit the flat and widely projecting echinus with a hollow below the annulets, in which the edges of the flutes of the shaft terminate. The architrave still generally remains higher than the frieze, and the triglyphs become narrower, the geison has similar mutules with 18 drops above them as well as over the metopes. The pediment loses something in height; the porous or coarse limestone is still always retained as a building material, but it is covered by stucco and painting. The colossal Ionic-Asiatic architectural undertakings of this period also aroused the Doric races to similar works, thus explaining phenomenal structures, such as the gigantic Temple of Zeus at Selinus and the heavy Temple of Artemis at Syracuse.

151. Monuments.

1. The Temple (S of Hittorf) in Selinus, placed on the plateau above the river, on a substructure of 4 steps, being a peripteral structure of 6×14 columns with an interposed colonnade in front, which is placed so near the cella wall, that the outwardly opening leaves of the doors scarcely had the space requisite for opening. The cella is divided into three parts,

with a disproportionately long central apartment (almost 1 to 4, the ancient Heraion at Olympia being 1 to 3.5, or 1 to 7 in the central aisle) and without antae. The columns are slender, strongly diminished, with 20 flutes, and have capitals with a strongly projecting echinus, 4 annulets and a weak hollow, in which the flutes terminate. The longest blocks of the architrave measure 15.157 ft.; the drops of the regulas hang free; the metopes are decorated by figures which exhibit Asiatic fashions of hair and beards and forms of features, as well as symmetrical garments with abundant folds; the entire entablature goes into the height of the column $2 \frac{1}{4}$ times. The columns of the inner colonnade have 16 flutes, which are separated from each other by fillets, like the Ionic. Vestiges of painting are preserved.

2. The great Temple of Zeus at Selinus was one of the largest in antiquity. Its length was greater than that of the mighty Temple of Zeus at Akragas, and it appears to have been only exceeded by that of the Temple of Artemis at Ephesus. A pseudo-dipteral structure rose on a substructure of 2 steps, having 8×17 columns, which had a strong diminution but no entasis, and were composed of great blocks and had 20 flutes. In the interior of the building were columns and capitals smaller than those found on the exterior; a subdivision of the cella into three aisles by two rows of columns, or a great uncovered court surrounded by columns, is therefore assumed. According to the vestiges of the masonry, the statue of the deity may have stood in a shrine at the rear of the cella or in the adjoining courtyard.

The temple was never completed; only two of the columns were entirely fluted; on others preparation is made for 20 shallow flutes; the remainder are still entirely plain. At the destruction of the city by the Carthaginians (409 B.C.), the temple was therefore not completed. The building material was furnished by the limestone quarry of the modern Campobello; drums of columns 7.874 ft. in diameter and 9.843 ft. high, intended for the temple and ready for transportation, still lie in the quarry; at that epoch, they must have been taken over an undulating country and then across the river Selinus to the city.

3. The Olympeion in Syracuse. Its site in the corn fields on the low hills still shows two monolithic Doric columns of tufa, whose surface is occupied by 16 flutes. The upper ends of

the shafts as well as the capitals are wanting, so that the ratio of diameter to height can no longer be accurately determined; yet it may be assumed at 1 to 4 $\frac{1}{4}$, the total height of the columns being about 26.24 ft.

Scarcely anything of the stylobate and steps is now preserved. It is of great interest, that painted terra cottas (now in the Museum at Syracuse) have recently been found near the columns, which bear the same character as those of Selinus, Olympia, and Athens, and which were indeed once used in like manner as in Metapontum, to decorate the roof cornice or to cover beams.

In the work named below,¹⁷⁷ the copper nails are not given, which were found later and accurately fit the holes in the terra cottas, but the use of terra cotta cases beside each other on wood and stone is assumed. The authors state in regard to the latter;¹⁷⁸ "we have put in place the fragment of terra cotta . . . which was applied as a facing for stone too coarse to be sculptured", . . . an explanation, that as an architect I can only adopt.

Note 177. Duc de Luyne & F. J. Debaeq. Metaponte. Paris. 1888. Pl. X, Fig. 2.

Note 178. Page 49 of the same work.

The coarse shelly limestone is full of holes and permits ornamentation only on a stucco coating, or more permanently on a terra cotta covering. The material employed for the Treasury of Gelo in Olympia indeed led to similar methods, and the metal nails in the limestone cornice there show the mode of fixing to the stone, while the copper nails of Metapontum represent that to wood. Both propositions of Duc de Luyne and Debaeq have been finally shown by the excavations and finds to be acceptable and correct.

The high antiquity of the Olympeion was first proved by the fact, that the lists of citizens were preserved there, and further by the circumstance, that the columns are monolithic, and it would not be going too far to date its founding back to the end of the 7th century, since moreover the temple was ornamented at great cost even at the beginning of the 5th century.¹⁷⁹ (Hippocrates of Gela).

Note 179. See Cavallari-Holm, pp. 23, 84, 85, 96, 284.

4. The Artemesion in Syracuse.

At this time there remains in place only the stereobate of the pronaos with the remains and vestiges of 19 columns and the lower ashlar of two antae. The temple stood upon a substructure of 4 steps, its elongated cella similar to that of Temple C of Selinus, being hexastyle and peripteral, the inner structure (pteron) comprising the cella with 2 columns-in-antis and an intermediate portico of 4 columns (Fig. 136). A flight of 12 steps 10.96 ft. long leads up to the middle of the pediment end of the temple. The sides have 17 columns, and not 16 as formerly supposed, monolithic with the architrave resting on them, which is 5.48 ft. thick and entirely plain. To this evidently belongs a dressed stone, .80 ft. wide and having 3 parallel channels of triangular section on its face, which extended above it as a taenia, as at the oldest Temple in Selinus. No vestige of regula and drops have yet been found, nor of the frieze and cornice.

107 According to the character of its style and its peculiarities, the temple at least belongs to the epoch of the oldest temples in Selinus and in Corinth, with which it has in common the primitive heavy proportions of columns, with other things. Cavallari-Holm¹⁸⁰ holds the sanctuary to be one of the oldest in Syracuse, which may belong to the 7th, if not to the 8th century. On the eastern upper step at the facade and beneath the two southernmost intercolumniations was found an ancient Greek inscription, which has been repeatedly published and differently explained. The character of the letters indicate the 6th century, yet its meaning relates to Apollo, consecrated gifts to whom were placed in the portico of his sister's temple, but not to the temple itself.¹⁸¹

Note 180. See the last work, pp. 78, 80, 284, 289. Figs. 136 and 137 give the ground plan and elevation of the temple, "this specimen of the most exaggerated Doric heaviness and energy".

The intercolumniations vary in size, differing on the facade and again varying from these on the long sides. The columns are thus, and especially on the sides, set so closely that their lower diameters are greater than the space between two columns.



This diversity in the distances between axes produces a lack of uniformity in the divisions of the triglyph frieze. Two solutions were possible on the longer sides: either on the assumption of uniform widths of triglyphs for the entire building, there was only a single elongated metope between two columns, or if we desire to retain the otherwise normal division of the frieze, then must the widths of the triglyphs on the long sides have materially differed from those on the ends.

On this indeed most ancient Doric stone temple, which yet belongs to the creations directly succeeding wooden architecture or mixed construction, there certainly appears the influence of Egyptian art, and especially the acceptance of the proportions and spacing of Egyptian stone columns in Grecian architecture. It is worthy of note, that here as well as at the ancient Fountain-Sanctuary in Cadacchio, at the Temples in Corinth and Assos, the regulas and drops beneath the taenia are wanting. Has this structural and decorative motive, assuredly borrowed from the ancient wooden construction, been intentionally neglected on account of the heaviness of the first stone monuments and only resumed later? But the ancient Treasury of Gelo in Olympia, that small stone structure, exhibits the regulas and mutules without drops!

5. The Temple in Corinth.

Its facade was hexastyle; according to the reports of Dörpfeld's excavations, the number of columns along the side has been fixed at 15; it was then a peripteral structure with 6×15 columns, and had two separate cellas, each with its own portico-in-antis, and it therefore was a double temple. The diameters of the columns on the facade were greater than of those along the sides, being 5.64 and 5.35 ft.; the distances between axes differed accordingly. Fragments of red stucco belonging to the wall or floor of the cella were found in the excavations. 182

Note 182. See Mitt. d. Kats. Deutsch. Arch. Inst. Athen. Abth. Athens. 1886 - 7. pp. 297 to 308.

205 The columns are monolithic, without entasis, have only a slight diminution and 20 flutes; they belong to the heaviest of all Grecian monuments. The capital projects widely, has a shallow abacus and 3 annulets without a hollow; the flutes intersect at the



lowest annulet in form of a flat curve. The necking is marked by 3 incisions very close to the echinus, the lower one indicating the bed-joint between the capital and shaft of the column. Of the entire temple, there now remains only 7 closely set upright columns, one of which is without a capital, five being spanned by partly ruined architrave, half of which has already fallen. The average length of the blocks is 12.53 ft.; the front surface of the architrave is set back from the line of the upper circumference of the column. The material (limestone) is quite worn away on the upper surface and is covered by cavities; no sharp edges longer remain, and no profile forms can now be accurately determined. As some places still show, the surfaces were covered with stucco.

6. Here should also be placed the ancient Temple in Tarentum discovered by Viola.

4). The Developed Doric Style.

152. Characteristics.

The works of the developed Doric style reject nearly all the imperfections and foreign elements in the architectural members, with which the monuments of the preceding periods were still burdened. A common base in the form of steps unites all the columns; the capital now consists only of the abacus, the echinus, and of 3 or 4 sharply cut and delicate bands, the annulets; the necking is limited by 2 or 3 incisions. The more powerfully developed echinus shows itself, according to Semper, "in that noble elasticity and masculine muscularity, which nowhere appears more beautifully, than in the temples at the end of this period, which already began to pass into use in the famous Attic Doric monuments". Besides the echinus, there also occurs on the monuments of the developed style the series of recurved leaves, and indeed as the crowning member of the geison, beneath the abacus of the antae-capital, with the purpose of crowning or terminating the parts of the internal structure, the entablature and the upper member of the cella wall. As a new addition should be mentioned the antae, which are attached to the walls of the cella, resulting from the endeavor to produce a more intimate union of the external colonnade with the cella, isolated in the ancient monuments.

153. The Monuments.

1. The so-called Temple of Hercules in Akragas, built soon after the founding of the city (which occurred 582 B.C.), a peripteral structure of 6×15 columns with an extended arrangement of steps on the eastern end. The cella is still long and is placed between a pronaos and an opisthodomos, each with a colonnade-in-antis; at the end of the cella was a small shrine for the statue of the deity; left and right of the entrance were stairs, which led to the attic. The columns had 24 flutes and were quite strongly diminished, yet were almost without entasis, the echinus was high and inclined less than 45° , but was still somewhat swelled in form, decorated beneath by 4 annulets, and with a single incision as a necking member. The face of the architrave coincides with a tangent to the upper circumference of the column. On the whole, the entablature is still high and heavy, the grooves of the triglyphs end in recurved cushion forms; the antae capitals are still of uncouth shape. The building material consists of yellowish porous limestone, the surfaces were covered by stucco.

2. The Temple of Poseidon in Paestum, a peripteral structure of the middle of the 6th century, with 6×14 columns on a substructure of 3 steps, with pronaos and opisthodomos, colonnades-in-antis and stairs at the entrance; the cella divided into 3 aisles by 2 rows of columns, the central aisle narrow and long (about 13.12 ft. wide).

The columns have 24 flutes, are diminished quite strongly with hardly any entasis and are inclined inward; the abacus of the capital projects widely, the echinus is not high and has an elastic curve, and there are 4 annulets and 3 incisions at the necking. The architrave is in blocks about 14.76 ft. long and lies in the same plane as the upper circumference of the columns; the triglyphs are slender, somewhat curved forward at the top, as on the Temple (C) at Selinus; the grooves end in pointed-arched form, without coves at the angles; the metopes are without sculptured ornament, are broad and have head-bands of equal height with those of the triglyphs; the geison is of strong height and projection, and is decorated at top by a cove and a small bead instead of a cyma. The total height of the entablature goes into

the height of the columns $2 \frac{1}{2}$ times. Besides the customary forms, the internal members exhibit the half round. The columns in the interior of the cella have 20 flutes on the lower order and only 16 on the upper one. (Probably arranged in accordance with the absolute dimensions of the surfaces of the columns). The outward and inward curvatures and cracks on the great horizontal architectural members are to be ascribed to defects in workmanship, easily to be recognized. The only temple in the Grecian style of architecture in which the internal construction is preserved for us in a form worthy of examination, it is also distinguished by solid construction in ashlar masonry, beautifully joined together without mortar. The same limestone was used here as in the Basilica and the Temple of Demeter, and it therefore required a coating of stucco and color. The outer surfaces are not smoothly dressed in some places: there frequently occur but roughly dressed surfaces surrounded by drafts, so that the temple cannot be assumed to have been completed in all its parts.

3. The so-called Temple of Zeus in Akragas, a colossal monument of antiquity, was a pseudo-peripteral structure with 7×14 columns above a peculiarly treated substructure with an arrangement of piers in the cella and of severely treated archaic atlantes for supporting the roof. The columns were moderately diminished and stumpy; 20 flutes were arranged for the complete column, and they were 1.80 ft. wide from edge to edge on the lowest drum; the echinus was high and steep, enclosed by 4 annulets and without any incision at the necking. The face of the architrave projects in front of the upper circumference of the column; the triglyphs and metopes are high and narrow, and the cornice is massive. The metopes were without sculptures, but as described by Diodorus, the tympanums were on the contrary most richly adorned by them. The height of the entablature goes into the height of the column about $2 \frac{1}{2}$ times. From the mighty dimensions of the temple, certain architectural members could no longer be made of single blocks; they were composed of several courses, though relatively still of great dimensions; thus for example, the architrave was 10.496 ft. high and was composed of 3 courses of stone placed one upon the

other, but the triglyph blocks of approximately equal height were monolithic; the capitals, excepting the abacus, were made of two pieces of stone, each of which measured 536.8 cu. ft.; the abacus consisted of 3 slabs placed side by side, and the drums of the columns were composed of intermediate central blocks and adjacent wedge-shaped pieces. A man could comfortably place himself within the flute of the column.

The arrangement of the interior, the entrances, and the mode of lighting, can no longer be determined with certainty.

The material employed is here again the light yellow fine-grained limestone, which was covered by stucco and painting.

L// Its rich appointments in paintings, statues and votive gifts, were repeatedly mentioned by the ancients; Carthaginians and Sicilians, taken at Himera, were employed in the erection of the temple. The temple was completed in all its parts, yet the destruction of the city by the Carthaginians (408) hindered its construction. Its last portion remaining upright fell on December 9, 1401; the mighty heap of ruins, "the Palace of the Giants", has since served as a source of supply of building stone; even in the past century, it furnished the materials for the Mole of Girgenti.

Many small members here appear somewhat uncouth. But it is not just to judge the architectural members in the same way, in case of monuments executed in porous or shelly limestone and intended to be covered with stucco, as in case of marble monuments, finished on the ashlar. It is nowhere stated, and can indeed be known in no case, that the stucco forms followed or repeated the stone forms with absolute accuracy. The coating of stucco was intended to fill up the defects of the material, and many forms on the fragments, which appear uncouth to us, having lost their coating of stucco, may have looked quite otherwise with it, - the artisans did not then proceed otherwise than is the custom today in a similar case, and which then as now results from the nature of the case. For the determination of the completed profiles of these portions of the architecture, which have lost their covering of stucco, there is consequently no longer any absolutely certain starting point.

4. The Temple of Athena in Syracuse, located on the island of

Ortygia in the harbor, was a peripteral structure with 6 × 14 (15 ?) columns. The subdivision of the much elongated cella, with columns between antae at its ends, is no longer to be determined. The columns stand close together, are strongly diminished, and are treated with little entasis and have 20 flutes; the monoliths of the pronaos are higher than those of the outer colonnade. The echinus is higher than the abacus and has 4 annulets beneath it, with 3 incisions on the necking; the anta capital is heavy. The entablature is no longer preserved in all its parts; the cornice is entirely wanting, and the triglyphs are narrow; the face of the architrave is brought forward of the upper circumference of the column. The transformation of the temple into a Christian church preserved the known portions of it to us; it was built of the light limestone of the Syracusan Latomia. According to Diodorus, the date of erection falls in the era of the rule of the Geomores and was therefore in the 6th century B. C. ^{183.}

Note 183. See Cavallari-Holm. pp. 92, 289, 290.

2/3 5. The Temple of Juno Lacinia in Akragas is a peripteral building with 6 × 13 columns and is of moderate dimensions. The columns are slightly diminished; the echinus of the capital is boldly and nobly profiled, and decorated beneath by 3 annulets; the neck band consists of 3 incisions. The angle of the architrave is brought forward; the cornice and the antae capitals are lacking. The material is a yellowish porous limestone, now very much weatherworn, and formerly covered with stucco. Only 4 columns are wanting, and 16 still retain their capitals; the northern side still has its entire architrave and a few pieces of the frieze; otherwise, only a block of the architrave remains on the southern side. Fazell saw the temple while still complete, yet he complained of the shattered columns and the progressive dilapidation. The ruins received some repairs by Torremuzza in 1787.

6. The Temple in Delphi (the fifth, according to Pausanias) built by Spintharus of Corinth under the direction of the Athenian Alkmaeonides, which they caused in part to be constructed of marble, instead of the porous stone required, in order to influence the oracle in their favor, was indeed a peripteral

structure with pronaos and opisthodomē. Pausanias at least mentions the "maxims in the vestibule" and a golden statue of Apollo in the "innermost part" of the temple, to which only a few had access. The figure decoration in the tympanums was by the Athenian sculptors Praxias and Androsthenes. Golden shields, dedicated for Marathon, and Galatian weapons, were suspended on the architraves.

7. The Ancient Parthenon was probably begun by Oimon and completed as to its superstructure, whose site must have been provided only in connection with the fortifications of the southern edge of the Acropolis, by substructures and filling. The structure was narrower and longer than the later building by Pericles.

8. Here is also to be placed the Temple of Zeus Olympios, also begun by the Pisistratides, only its substructure being then completed, and which was only continued by Antiochus 9th and completed under Hadrian in the Corinthian order. The still visible portions of the stylobate are constructed of white marble.

9. The so-called Temple of Concordia in Akragas is a peripteral structure with 6 × 13 columns, and is of medium size with columns arranged between antae, opisthodomē and pronaos, with stone steps at the entrance and leading to the roof, with a pediment wall and a peculiarly formed opening in this above the antae colonnade. The columns are not greatly diminished, are without marked entasis, have an echinus of straight profile on the capital, a series of 4 annulets, but no incision at the necking; the antae capitals are of heavy form. The material for the temple was furnished by the yellowish limestone already mentioned; its better preservation is probably due to the circumstance, that it was once transformed into a Christian church (in the 15th century, San Giorgio della rape). For this purpose, the cella walls were unfortunately perforated by 12 large openings with round heads, and the intervals between the columns were walled up in order to thereby produce a 3-aisled interior. The entablature of the temple is rather heavy; the columns each consist of 5 drums. It was restored in 1788 and now belongs with the best preserved monuments of antiquity (Fig. 143).

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1010. The so-called Temple of Castor and Pollux in Akragas was a peripteral structure with 6×13 columns and a stylobate of 3 steps. The Sicilian Archaeological Commission caused the three columns of the northwest angle with the appertaining entablature and that portion of the pediment to be rebuilt with the ancient materials. The yellowish limestone was covered by stucco; lions' heads, red and blue frets and painted palm leaves have preserved evidence of polychromy.

11. The so-called Temple of Ceres and Proserpina in Akragas, whose ruins were built into the Church of St. Blasius, was a small cella-in-antis; only the substructure and a portion of the cella wall resting on 3 steps are still preserved; nothing now remains of the cornice and of the columns.

12. The so-called Temple of Asclepius in Akragas is still smaller than the preceding and was a double antae temple on a substructure of 4 steps. Of this, there yet remains two columns and the antae of the northern angle of the cella wall up to a height of about 16.40 ft., with most of the walls of the cella and the southern antae. No portion of the capitals or of the cornice now exists.

13. The so-called Temple of Zeus Polieus in Akragas was built into the Church of St. Maria de Greci. The remains consist of steps on the Northern side, on which rise the stumps of 8 Doric columns, together with portions of the southern substructure and a few fragments of the entablature. The temple was really a peripteral structure with 6 columns in front.

14. The Temple at Egesta (Segeste) was a peripteral building with 6×14 columns, located on the brink of a deep ravine through which flows the brook Pispisa, was never entirely completed, but so far as finished, is executed in noble proportions. Only a few foundation stones of the cella have been found; the columns are composed of an unusual number of drums (10 to 13), only roughly dressed and without flutes still. The capital is bold and is decorated by 3 large annulets; the incisions at the necking are also lacking. The face of the architrave is set forward; the entablature and the height of the pediment are finely proportioned. The material of which the temple is built is a limestone of the vicinity, which has by lapse of time become a beautiful golden

brown, and which has well resisted the effects of exposure. The date of erection is usually assumed prior to 409 B.C., before the Carthaginian invasion put an end to the architectural activity of the Egestans.¹⁸⁴

Note 184. For the study of the arrangement of stone-cutting and for the procedure of this work, no other Grecian temple affords such interesting material, as that in Egesta. By a thorough investigation with the necessary outlay of time and means, much valuable knowledge must be obtained here.

15. Of the Temple of Gela, only a single column yet remains.

16. The Temple north of the City of Himera and near the sea is a Doric structure, whose columns nearly coincide in magnitude with those of the Temples of Juno and of Concordia. Beautiful fragments of it, among which are lions' heads, are now in the Muesum at Palermo.

17. The Temple (A of Hittorf) on the Acropolis of Selinus was a small peripteral structure with 6×14 columns on a substructure of 4 steps, with pronaos, episthodom, and a cella divided in two parts in length, and it probably belongs to the completely developed style. The diminution of the column is slight, with little or even no entasis; 20 flutes surround the shaft; the echinus of the capital is straight and steep, decorated by 3 annulets, and the necking is indicated by 2 incisions. The lengths of the architrave blocks run from 9.216 to 10.89 ft. The proportions of the building are in general similar to Attic. A winding stairway, which was on the right of the entrance and in the first apartment of the cella, is still to be mentioned. Not a single shaft of a column of this temple has been entirely preserved; most of the stones of the one lying nearest the sea have been carried off.

18. The Temple (B of Hittorf) in Selinus, the southernmost on the eastern plateau, was a peripteral structure with 6×15 columns on a substructure of 4 steps, the lower steps of less height than the upper ones, with a broad flight of steps extending along 3 intercolumniations at one end, and likewise belongs to the completely developed style. The cella has the same plan as that of Temple A; the first apartment of the cella is on a level considerably higher than that of the pronaos, and the

second room is again higher than the first. The columns are slightly diminished, are animated by 20 flutes, and consist of 7 drums each. The echinus of the capital is inclined at almost less than 45° , is nearly a straight line in profile, and it has 4 annulets and a simple incision at the necking. On the other hand, the antae capital is still of heavy form. The architrave is again set back of the line of the upper circumference of the column; the blocks measure 14.596 to 15.449 ft.; the height of the entablature goes $2 \frac{1}{4}$ times into the height of the columns; the height of the pediment amounts to $\frac{1}{8}$ the base of the triangle. Vestiges of painting have been ^{2/6} found in many places, and there is still a fine white stucco on the drums of the columns. Serradifalco describes one of them as painted with horizontal bands of red, white and blue. The astragal of the capital was red, the head band of the architrave was of the same color, and the triglyphs were blue; the draperies of the metope figures were colored; black and red frets on a yellow ground, and black and yellow decorations occur on the terra cottas.

The remains of sculptures (5 metopes, discovered by the English architects Harris and Angell and removed in 1831) were arranged between the triglyphs of the pronaos and opisthodomos, and recall the works of the era of Phidias. The nude portions of the female figures, such as heads, arms, hands and feet, are made of white marble, all the remainder being of limestone from Memfrici. They are now placed in the Museum of Palermo beside the more ancient metopes from Selinus. Three columns of the temple still stand partially upright at the southeast angle; all the remainder have fallen.

19. Of the little so-called Temple of Empedocles (B of Hittorf) on the Acropolis of Selinus, only the foundations, the lower portions of the western rear wall and considerable remains of the side walls have been preserved to us; but nothing of the front end yet exists. According to the ruins discovered, Serradifalco explains the sanctuary as being a Doric antae temple, while before him, Hittorf, on the basis of a portion of an Ionic capital found in the vicinity, restored the temple as a prostyle structure with 4 Ionic columns before the cella, with a Doric triglyph-frieze above them. The vestiges of color

on this temple gave for the antae and the entablature a pale yellow tone on the stucco coating; the bands of the cornice, of the mutules, and of the architrave, were painted red, the mutules themselves, the triglyphs and the regulas were blue, while the drops remained white (probably originally gilded); the grooves of the triglyphs were made a dark blue-black.

20. The Temple of Athena on the Island of Egina stood on a far visible high platform of rock, and was a peripteral structure of 6×12 columns on a substructure of 3 steps.

The temple structure consists of cella, pronaos, and opisthodomos, opening at the ends in colonnades between antae, the interior being divided in 3 aisles by 2 rows of columns, 5 in each. The columns are moderately diminished with a scarcely perceptible entasis and are surrounded by 20 flutes. The capital is still rather high and strongly projecting, decorated by 4 annulets, the necking indicated by 3 incisions. The flutes end in flat curves, their endings coinciding with the lower edge of the lowest annulet. The face of the architrave is brought forward in front of the upper circumference of the column; the entablature goes $2 \frac{1}{2}$ times into the height of the column; the latter is $4 \frac{1}{2}$ times as high as the substructure of 3 steps. The height of the pediment (tympanum) is $\frac{2}{15}$ its base line; the wall of the tympanum is set back behind the face of the architrave. The angles of the pediment are decorated by griffins carved in marble, and the apex by a scroll ornament and two small figures of the same material. The famous pediment figures (now in Munich) are likewise executed in white marble, while the entire architectural portions are constructed of porous limestone, covered with stucco and decorated by painting, numerous vestiges of which are still preserved.

Regulas are found on the architraves of the pronaos and of the colonnades of the cella, while to them corresponds no arrangement of triglyphs in the frieze lying above them.¹⁸⁵ Above the upper colonnade of the cella, the masonry appears to have been extended to the roof, and solid blocks of stone with arrangements for connection with the adjacent courses of tiles were placed instead of gutter tiles at the junction of the wall and the surface of the roof. Cockerell explains these as being

the enclosing blocks of a hypaethron, which the smallness of the temple, aside from the previous statements in regard to this point, causes to appear unnecessary. The sun might already be quite high and still cast its rays throughout the entire length of the temple (Fig. 144). The conditions for lighting the interior were here very favorable, by means of the great doorway and the elevated site of the temple. The columns were inclined towards the cella; 21 of them still stand, much worn on the upper surfaces, in many places held together by iron bands, and partly still connected by architraves, while the frieze, geison, and the walls of the cella lie prostrate on the ground. The clamping together and the provision for setting the dressed stones are of interest.

Note 185. Did no changes in the plans occur here during the progress of the work?

21. The Temple of Aphrodite (a Temple of Athene, according to Cockerell) at the harbor of Egina, of which only the shaft of a single column now exists, but which Cockerell published as then consisting of two complete columns with a block of the architrave, was a hexastyle structure on a stylobate of 3 steps, and was also of larger dimensions than the one just described. The columns are here decorated by 20 flutes and are somewhat slender, having a height of $5 \frac{5}{6}$ lower diameters, while their capitals exhibit forms almost identical with those of the temple described under 20, except that the abacus is scarce perceptibly larger than the echinus bordered by 4 annulets; the necking is indicated by 3 incisions of exactly identical form.

22. The Temple of Zeus at Olympia, more renowned for the place of its location and for the very famous and most important work of Greek sculpture placed within its walls, the chryselephantine statue by Phidias, than for its architectural beauty, was a peripteral structure with 5×13 columns, with front and rear vestibules-in-antis, built of native tufaceous limestone or shell conglomerate by the Elean Libon (only the roof tiles consist of Pentelican marble). The diameters of the columns frequently differ about 2 inches, and were strongly diminished; the capital has a broad abacus and "a high, soft, yet nobly profiled echinus" with 4 Attic annulets and 3 incisions

at the necking. The entablature was proportionally light; the length of the architrave blocks varies from 15.81 to 17.023 and 17.22 ft.; in width it was composed of three unequal blocks 2.56, 1.67, and 2.33 ft.; and as usually the case, the outer blocks also here abut against each other at right angles, the joint on the long side extending through, those behind it in the opposite direction. The frieze and architrave in the interior of the peripteral colonnade lie in the same plane, a vacant space was left between the triglyph-frieze and the continuous frieze. The antae capital was elegantly shaped, and consisted of a cove and a peculiar ogee leaf moulding, almost³⁸³ exactly similar to that at Rhigaleia. As in Rhigaleia and on the temples in Selinus, an internal triglyph-frieze was carried above the front and rear vestibules, and this was returned as in the temples mentioned. The cella walls are constructed of ashlar carefully fastened together by iron cramps set in lead, the lowest course being composed of blocks set on edge (as on the Parthenon, the Theseion, in Paestum, etc.), and the cella was internally divided into three aisles by two rows of columns, which in part may have been separated from each other by metallic grilles, holes for fixing which seem to appear on the lower drums of the three western pairs of columns of the central aisle.

The temple was most fully described by Pausanias among all Grecian monuments. He speaks of the gilded prize vases on the angles of the pediment, the gilded goddess of Victory on the apex of the gable, the rich figure sculptured decorations of the pediment and of the metopes on the end of the temple. He mentions Paeonios of Mende and Alkamenos, the contemporary of Phidias and next to him the first of artists in sculpture, as sculptors of the pediment figures. He intimates that the beautiful statue of Nike found by the German expedition was the work of the same Paeonios. But in comparison with the statues of Nike and the figures by Phidias, the pediment statues are of such inferior value, that they cannot have been the work of the same or of equally famous contemporary artists. After the image of Zeus had been completed, it may have been decided to award to the sculptors mentioned the commission for the execu-

execution of the new pediment statues in place of the antiquated and but slightly artistic ones, which was not carried out during the beginning calamities of the civil war, so that a connection arose between the names of famous artists and the ungraceful pediment sculptures, again brought to light. Pausanias likewise mentions the bronze doors, the inner colonnades set in two tiers, one above the other, by which access to the statue of the god was made possible, the winding staircase even leading upon the roof, which must have been narrow, close, and built of wood, the god being seated on a throne, his head adorned by a garland of olive leaves, and with the Nike standing on his right hand, and also the walls were decorated by paintings by Panainos, the consecrated gifts and the great altar of sacrifice. The temple and its art works sank into ruins and disappeared beneath the alluvial soil; the French expedition under Blouet merely recovered a portion of it, and the latest German expedition considerably increased the find, although the parts of the building were found to no longer rise more than 4.92 ft. above the original level of the earth beneath them.

5). The Attic Doric Style.

154. Characteristics.

The monuments of the Attic Doric style exhibit the highest perfection of form with delicately considered proportions and moderate dimensions. The columns are more slender than during the preceding period, are less diminished and swelled, have only a slight entasis, scarcely perceptible to the eye, and they are surrounded by 20 flutes of elliptical section and with sharp edges. The echinus is steeply inclined and nearly straight, and the abacus projects but a few twenty-fifths of an inch beyond it; its lower edge is bordered by 4 delicate annulets. the necking is generally indicated by a single incision.

2/9. The entablature is in the most beautiful harmony with the columns which support it; the projections of the cornice are bold; the details are delicate and graceful, partly permeated by Ionic elements. Most of the buildings of this period are executed in white marble, on which the decorative painting was directly applied. The technical skill is in them a perfected one, although slight irregularities and imperfections also occur here,

as on all works of human hands. The jointing is excellent throughout, now being almost invisible, a circumstance to be ascribed to the hardening of the joints in the course of centuries, after the disappearance of the protecting coating of color and the corrosion of the external surface of the crystalline limestone.

The dressed blocks of stone are generally fastened together by iron cramps and dowells set in cast lead, without the use of mortar.

As already stated, it is not proved to be as asserted, that the material afforded opportunity for bolder spans of the architrave and larger intercolumniations, since no Doric monument of marble attains the length of architrave in the porous limestone temple of the same order. (Compare the Theseion and the Parthenon with the Temples at Selinus, Eggesta, and Olympia). The view that marble gave opportunity for more delicate treatment of the details is also not proven, for similar refinements could be executed in stucco, and as already stated under 4), 3, and we judge it to be incorrect from the profiles prepared from porous limestone, to decide upon the greater or lesser delicacy of the no longer existing stucco forms, whose frequently but rudely cut nucleus they were. (For example, merely observe the beads on some porous remains in Sicily, coated with stucco, whose nucleus is not round, but is evidently three-sided or is left in angular form, etc.).

In presence of the existing monuments, it is not correct to designate porous limestone as the Doric structural material, and to wish to derive from its peculiarities the close-spacing of the columns as a necessary result, as well as to wish to introduce marble for the possibility and for the demand for wider spans of architrave. Marble exercised scarcely any influence upon the form treatment of the facade of the Doric temple; it only did away with the otherwise usual stucco coating of slight durability, and made possible the direct application of the color to the structural material; its use was in almost all cases compelled by local conditions. Where it lay near at hand, it was employed; where this was not the case, men were satisfied with other materials, even in the best period (See Phigaleia).

Compared with the Peloponessians, the Sicilians, and the Italian Greeks, the Greeks of Asia Minor were in an incomparably better position in regard to building materials; they could earlier and more readily use marble than the former, for the reasons given. The new material produced a change only in the construction of the Doric temples; the beams of bold span and the stone ceiling of coffered slabs are results of the material. Stone beams of small cross section and a length of 21.32 ft. and coffered ceiling slabs 10.496 ft. long and 1.476 ft. thick are to be included among these. The customary ancient wooden frame-work covered with terra cotta was compelled to yield to the monumental stone ceiling, at least in the portico, in the pronaos, and in the posticum.

155. The Monuments.

1. The so-called Temple of Themis at Rhamnus in Attica (6.9 miles from Marathon), demolished by the Persians, and probably among those not required by the popular will to be rebuilt, was a small chapel-like structure on a rocky terrace about 328 ft. above the sea, and consisted of a cella and pronaos with a colonnade-in-antis. The height of the columns is $5 \frac{1}{2}$ lower diameters; the capital still projects strongly; the echinus has 3 annulets beneath it, while the necking incision is wanting. The masonry of the cella consists of polygonal coursed Pentelican marble, and the architectural portions of the facade are of soft porous limestone.

2. The so-called Temple of Nemesis at Rhamnus was a small peripteral structure of 6×12 columns with a pronaos-in-antis, built of marble, the capitals of whose columns exhibit a still steeper form of the echinus, than that on the Parthenon. The date of its erection should be placed at the middle of the 5th century B.C.

3. The so-called Temple of Theseus in Athens (called a Temple of Hercules or of Hephaistos by others), of the era of Cimon, (?) is a peripteral structure with 6×13 columns on a substructure of two steps, built of white Pentelican marble and resting on a foundation of stone from Piraeus, and is located in the lower part of the city near the ancient Keramikos. The date of the erection of this beautiful temple,

one of those best preserved, is not accurately known. The coffers of the paneled ceiling bear stonecutters' marks and letters, whose forms indicate the date of about 460 B.C. ¹⁸⁶

Note 186. The marks here mentioned may be falsified; it is not impossible for a later individual to cut ancient marks. Proofs of this kind are always risky or even indecisive. --On the Theseion, see also Gräf's essays in Baumeister's Denkm. d. Kais. Alterth., Vol. 3, p. 1774 to 1779. Munich and Leipzig. 1888. -- Also, Durm's Polychrome and Constructive Details der Griechischen Baukunst. Berlin. 1880. (Also in Zeits. f. Bauw. 1879, p. 111, 281, 411, 526). -- Dörpfeld makes the Theseion contemporary with the erection of the Temple of Sunion and holds that it is much later than the Parthenon, which may be true. (See Mitt. d. Kais. Deutsch. Arch. Inst. Athen. Abth. Athens. 1884. p. 336).

The temple structure consists of the simple cella with pro-naos and posticum in-antis, and it was transformed into a church in the Christian period, to which circumstance is due its good preservation.

The columns are constructed of single drums set on each other, are set inclined toward the wall of the temple, have no very marked diminution and a scarcely perceptible entasis. The echinus of the capital is straight in out line, inclined somewhat less than 45°, and at its greatest projection slightly recurves toward the abacus; four delicately carved annulets surround the former, and a single incision marks the necking.

The blocks of the architrave are 8.56 ft. long, were set a little back of the upper part of the columns, and were somewhat higher than the frieze. On the latter, only the metopes of the eastern and the four adjacent ones on the sides were decorated by reliefs; the others were left smooth, but all were set in grooves in the triglyphs. As a peculiarity should be mentioned the dissimilar treatment of the frieze on the eastern and western ends of the cella, which appears in both places as a continuous figure frieze, as in the Ionic order, and does not bear triglyphs. On the eastern end, the heavy beams of the architrave extend above the antae of the cella

to the architrave of the peripteral colonnade, intersecting these at right angles and resting on the same columns. This architrave is crowned by a moulding decorated by foliage, above which the figure composition extends from one end of the figure frieze to the other. Above the frieze is a geison decorated by fret patterns, and which is crowned by a delicate ovolo moulding. On the western end, the frieze only extends above the colonnade of the cella; the architrave and frieze are returned in narrow borders on the long sides, while the geison above the frieze over the portico extends even to the figure frieze on both sides. Corresponding to this omission of the frieze, the antae assume broader and narrower forms. Below the stone course, which projects $5/16$ inch, the antae and the wall of the cella have a separate ogee base. (Compare Fig. 60, p.76).

The broad ceiling beams of the portico are arranged without reference to the columns; thin slabs of marble cover the spaces between these beams and have square openings, which in turn are closed by hollowed-out coffer blocks. This construction of the ceiling, already described in some detail, is still in part well preserved, together with its vestiges of color.

The low tympanums, which must have formerly contained figure ornamentation, are now plain and bare. the roof has fallen. a tunnel vault protects the cella from the rain, and this contained a rich collection of antiquities a few years since, but now retains merely a few plaster casts. The ash-lars are wrought and joined together in the manner previously described. the surface of the marble is covered by the golden tint peculiar to Attic monuments. The columns of the peripteral colonnade each stand on an entire block of the stylobate; beneath those of the pronaos and of the posticum, these step blocks are injured. In spite of the comparatively good preservation of the monument, it must still be added that the stylobate is defective in arrangement and is greatly injured, that the floor of the portico is partially broken away, that the columns have been cut into in many places, that very many drums are moved back from their original posi-

positions, and that the northwest angle was much injured by lightning, so that the angle column must be held together by iron bands: that the second column from the southwest angle of the western end has its drums quite turned around on each other, and the underlying portion of the stylobate is broken, and the greater number of the columns along the southern side are in the same condition. The middle block of the architrave on the western side shows a crack extending in an oblique direction through the frieze, cornice, and the entire pediment; another portion of the architrave near the southwest angle is also shattered, and the architrave and cornice of the southern side are much injured by cracks, etc. The deformations on the stylobate³ (exaggerated in the drawing) here run in quite irregular zigzag lines. the four angles do not lie in a common plane, just as on the Parthenon. What technical importance would be possessed by the curvature of a horizontal line below the horizon amounting to about 1.181 inches in a length of 104.17 ft., or not quite 0.91 inch for a length of 44.98 ft.?

The cracks in the architrave, the piled-up columns, and certain inaccuracies in the execution, enable us to judge without difficulty of the influence exercised on these monuments by the so-called curvature.

4. The Parthenon on the Acropolis of Athens, the masterpiece of Iktinos and Callicrates, erected under Pericles 447 to 434 B.C., according to Löschke's very recent investigations, was in both form and magnificence the most important of Doric buildings in the mother-country of Greece. It is a peripteral structure with 8×17 columns on a substructure of 3 steps (Fig. 146), built of Pentelican marble on a foundation partly of Piræus stone and partly resting on the solid rock,¹⁸⁷ and it owes its preservation until two centuries since to the circumstance, that in the Christian period it was changed into a church. The enclosed temple is elevated above the floor of the portico by two steps and has at its ends hexastyle prostyle inner porticos with massive entrance doorways in the transverse walls. The eastern and principal entrance leads into the cella, divided into 3 aisles by 2 rows of columns, and which contained the chryselephantine statue of the Parthenos; the western leads

into an apartment with a ceiling supported by 4 columns, the treasury of the Attic state. The cella was subdivided in its length into two principal apartments. The porticos, pronaos, and the posticum are all narrow.

Note 187. The temple commenced by Cimon was narrower and longer, and therefore the existing foundation of the building by Pericles must have been extended in width about 19.68 ft. along the north side. (See *Antike Denkmäler*, pub. by Kais. Deutsch. Arch. Inst. Vol. 1. Berlin. 1887. pl. 1, where the plan of Cimon is drawn upon that of Pericles; also details concerning its architectural history in, Bötticher, A. *Die Akropolis in Athen*. Berlin. 1888, for which book were used the striking illustrations of the first edition of this volume; also, Baummeister, *Denkmäler d. Klass. Alter*. Vol. 2. Munich & Leipzig. 1887, p. 1171; lastly, Harrison, J.E., *Mythol. and Mon. of Anc. Athens*. London. 1890. p. 430 = 469.

Of the two current plans of the Parthenon, by Penrose and Bötticher, the ground-plan of the former is to be accepted as correct and assured, according to Dörpfeld's examination. It is here stated that the "Athenian people understood the entire temple to be the Parthenon, but had named the treasury with its vestibule the opisthodomē", while the official designations of the rooms were opisthodomē, Parthenon, hekatompedos, and pronaos. (See *Cent. d. Bauw.* 1881. p. 340; also *Mitt. d. Kais. Deutsch. Arch. Inst. Athen Abth. Athens*. 1881. pl. 12.). -- In *Delton* (1890, p. 92) and in the journal *Adena* (1890, p. 627), Lolling published an inscription found on the Acropolis of Athens and interpreted by him, which refers to the old Temple of Athena, and which certainly states, that this was called to hekatompedon in the 6th century. Hence he assumes that this also continued in the 4th century, and it follows from this, that the different parts of the Parthenon have heretofore been named erroneously. But on the contrary, Dörpfeld (*Mitt. d. Kais. Deutsch. Arch. Inst. Athen. Abth. Athens*. 1890. pl. 15) explains the name of hekatompedon as only fixed for the old Temple of Athena during the period before the Persian war, and holds the given name of Parthenon to be correct.

The external columns are inclined toward the wall of the cella, are composed of drums of medium size, and are surrounded by 20 flutes of elliptical section, which intersect in sharp edges and disappear at the lowest annulet of the capital. The columns each stand upon two blocks of the stylobate, which abut at the axis of the column; they are not strongly diminished and have a slight and scarcely visible entasis; the capital has a steeply inclined and almost straight echinus and is surrounded below by 5 annulets, the necking is limited by a single incision. The surface of the architrave is somewhat inclined, and as at the Theseion, it projects beyond the upper surface of the column, is composed of three blocks in its width, and is but very little higher than the ^{3/4}frieze, whose metopes are inserted in grooves and are decorated around the temple by figure reliefs.

Triglyphs and metopes are decorated by a beaded astragal above the head band. The cut blocks of the frieze do not closely join in the interior of the wall, but are set with interspaces, and are therefore carefully joined together by iron I-cramps. The triglyph frieze does not extend above the wall of the cella; but as at the Theseion, it is changed into a continuous figure frieze, carried around all four walls, and merely reminiscences of the former are found in the regulas with drops remaining beneath the frieze.

222 One may accept the explanation of Dörpfeld, that a triglyph
223 frieze also was intended here, but was given up during the progress of the building, and after the blocks with the regulas and drops had already been completed; but it is not applicable to the portions of the frieze made of terra cotta, in which ornaments occur over the regulas and drops. The artist certainly did not there consider anything else than the taenia and regulas complete.

The frieze is crowned by a cornice composed of a moulding with leaves, a geison and an ogee moulding, on which the outlines and marks of the former painting are still well preserved.

The ceiling of the portico is higher than the geison and was only constructed of stone beams at the ends; along the sides, large coffered slabs covered the spaces between the wall of

the cella and the colonnade. The pediments were adorned by groups of figures, which referred to the Birth of Athene and to her Contest with Poseidon over Attica. Cymas with painted anthemion ornament extend along the pediment cornices only and end at the angles with lions' heads, above the cornice on the sides rose a continuous row of antefixas, which as already stated, had no connection with the roof tiles, but were merely ornamental. The capitals of the antae exhibit on their peculiar mouldings painted eggs-and-darts as an eccentricity; the capitals of the accurately vertical columns of the pronaos and opisthodomos have but 3 annulets.

The pyramidal diminution of all architectural members, of the columns and of the walls of the cella, of the architrave and of the triglyph frieze, is carried out with considerable rigor in this building; the batter (Tunder the right angle") of the surfaces of the abacus (the later period follows exactly the opposite principle), and the overhang of the antae should especially be mentioned. The extremely slight entasis, not drawn in the earlier publications (which should have a magnitude of about .013 inch for a drawing of the columns 6.31 inches high) was first determined by the English architect Jenkins and then confirmed by Hoffer and others. A passage of Cicero was little considered in former centuries, but already refers to the obliquity of the axes of columns in general. For when Verres was led into the Temple of Castor, he asked what he should do there; to which the reply was made; "nothing, unless he might wish to set these columns vertical". This perfectly ignorant man asked the meaning of "setting vertical". The reply was that in a temple, there was not a single column, which was not inclined from a vertical.

The movable metallic decorations possessed by the Parthenon were already considered in treating of the architrave; transverse and rectangular holes on the centre of the architrave beneath each metope of the eastern end, as well as circular marginal traces, indicate their forms and the mode of fastening them (Fig. 147). The shields were sometimes described as taken from the Persians and dedicated by Alexander, sometimes ascribed to a gift of the orator Lycurgus, having been hung

up during his flourishing administration. The "Lachares fleeing from Demetrios" was taken down again in order to fill his treasury with the value of the metal; thus this important ornament had already been lost in antiquity.

Beneath each triglyph of this side is to be found on the architrave a number of small holes, drilled with a certain regularity, and which are assumed to have served for fastening letters of gold or bronze, but whatever was inscribed there cannot now be made out.

The rectangular holes without marginal marks or other accessories are found on the western end only above the axes of the columns, and they are therefore at the joints of the architrave and beneath the centres of the angle triglyphs, so that the decoration there must have been of a different kind.

224 Beneath each triglyph on the northern and southern sides, three iron pins $\frac{3}{8}$ inch in diameter and bent upward were inserted to mark the angles of a triangle, and these were again intended to receive a special decoration (Fig. 147).

The intervals between the columns of the pronaos and of the opisthodomos were closed by metallic grilles extending up to the capitals. Iron pins, similar to those on the architraves of the northern and southern sides, but whose purpose is not explained, are also found on the inner angle of the architrave of the opisthodomos and on the sides of the capitals of the columns of the pronaos and of the opisthodomos, turned toward the cella. It is 188 consider it doubtful to assume these to have been for bird screens.

Note 188. See Mitt. d. Kais. Deutsch. Arch. Inst. Athen Abt. Athens. 1889. p. 233, 328.

The fate of this building, the deformation of the horizontal lines, and the painting, have all been described in various places. After its surface had been corroded, the marble was in part covered by a golden-brown lichen, especially on the eastern and western ends, while the southern side remained an almost dazzling white, and the northern side shone with a cold gray tone.

5. The Propyleion in Athens, the state portal to the temple precinct of the Acropolis of Athens, was built of white Pentel-

Pentelican marble by Mnesicles (437 - 432 B.C.) and likewise under the administration of Pericles. Proportions and treatment of form are allied to those of the Parthenon. The entrance is decorated by pediments like a temple; its columns are likewise inclined toward the interior. The central intercolumniation is considerably wider than the adjacent ones, and the frieze has two triglyphs above it. As shown by Hoffer, the construction of the frieze here differs from the usual one, metopes and triglyphs being wrought from a single block. The internal ceiling is supported by Ionic columns, an example of the combination of Doric and Ionic forms during the best period. The structure of the portal is externally flanked by two projecting buildings of unequal size, decorated by columns, one of which served as a guard-house, and the other was adorned by pictures and is designated as a picture gallery (Pinacothek). The grand staircase passed between these to the entrance hall with its 5 doorways (Fig. 148). In accordance with its sloping site, the outer pediment facade of the portal was lower than the inner one, which belonged to the temple precinct. The difficulties of the location were skilfully conquered and were equalized by the flight of steps and the wall of the portal; the two pediment roofs of the outer and inner porticos no longer exist, but were probably arranged one under the other, which must be considered as a not very happy solution.

The antae capitals with the necking curved outward and the broad fillets are unique. The doorways, as shown by the reveals, were enclosed by rich borders of marble or metal, or perhaps by frame and architrave of wood, and must have been closed by bronze folding doors. The building was never entirely completed, as shown by the still unwrought steps at the entrance, as well as by the outer and inner walls of the guard-house; it is therefore surprising, that in spite of these, the painting was already finished on the upper parts, as numerous vestiges of it have been found, and again very recently on the portions walled into the water-tower, since removed.

Note 189. The lower surfaces of the drops on the geison were painted in annular form, the mutules were blue, the ad-

adjacent band red, etc.

Lightning, gunpowder and cannon balls also destroyed this astonishing structure of antiquity, of which merely the shafts of the columns and the enclosing walls are now standing.¹⁹⁰

Note 190. For the building with all its details, see; & Bohn. Die Propyleion von Athen. Berlin & Stuttgart. 1882; further, the essay on this work with sketches by J. Durm; in Zeit. für Bild. Kunst. 1884. p. 291 = 301; 320 - 325; accordingly the pediments perpendicular to the portals of the north and south porticos are not to be accepted, which were given by Canina (Arch. Greca. Sez. II. Pl. 117) Rome. 1834 - 41) and adopted by Bohn.-- An essay in Deutsch. Bauz. 1886. P. 19, gives interesting conclusions relating to a possible original design by Mnesicles. Also see Harrison, p. 35, and especially Mitt. d. Kais. Deutsch. Arch. Inst. Athen Abt. Athens, 1885, pls. 2, 3, 5, from which we reproduce in Fig. 149 the existing building and very probably the original plan. Dörpfeld's restoration of the elevation is also spirited and satisfactory, and rejects the pediment of Canina.

6. At the same time and under the same administration with the Propyleion and the Parthenon, there likewise arose the Telesterion in Eleusis, of which scarcely any remains worthy of notice still exist there; it was a white marble structure designed by Iktinos, whose ground plan has already been described.

7. The Temple of Apollo Epicurios at Bassae or Phigaleia in Arcadia (shortly after 430 B.C.) was erected in gratitude for averting a pestilence and was a peripteral structure with 6 x 15 columns on a stylobate of 3 steps, executed in a light bluish-gray limestone, and was built from the designs of the famous architect of the Parthenon (Fig. 149).

Pausanias states that together with its roof, it was of marble (limestone?), and in consideration of the beauty of the stone and its jointing, describes this as the most beautiful of the temples in the Peloponnessus, after that of Tegea. The cella has a pronaos and a posticum, both in-antis, and is in its length divided into two apartments, the front one of these having pilaster-like projections along its sides, whose edges are treated like Ionic half columns and extend to the ceiling.

The second and smaller room is separated from the former by two oblique piers and a central column, and it has a separate entrance from the side. The central column exhibits a Corinthian column (perhaps the earliest use of this in Greece), so that all three orders occur together in this temple, distinguished by its beautiful proportions and details. More recent investigators prefer to consider the middle cella with columns as an uncovered court; I cannot adopt this assumption, on account of the smallness of the plan. The steps of the stylobate differ from the simple form, since they exhibit three slight recessions on the lower part; the same treatment is repeated in a unique way on the projecting lower course of the wall of the cella. The columns are surrounded by 20 flutes and are somewhat more than 5 lower diameters in height; they stand absolutely vertical and have no entasis; like those of the Temple at the harbor on Egina and those of the Temple at Corinth. The orientation from south to north is remarkable and contrary to rule.

Every possible little refinement, "pleasing to the eye", which is "perceptible to the senses but scarcely apparant to the eye", is here omitted, yet the temple exerts an undying spell, like that of the Parthenon, the great work of the same

226 architect.

227 The capital even projects somewhat less than that of the Parthenon, and the echinus is decorated beneath by 4 annulets; the necking is marked by 3 incisions. The antae are diminished and have in the treatment of their capitals something allied to those of the Temple of Zeus in Olympia. The tympanum and the metopes of the external colonnade are left plain, while those on the ends of the cella are decorated by reliefs; the triglyphon-frieze is returned at the angles, but does not extend along the sides (Fig. 150).

The more important sculptured ornamentation is here placed in the interior, an animated and richly composed figure frieze extends along above the series of Ionic columns.

The Ionic-like cyma is decorated by sculptured anthemions and only extends along the inclined cornices of the pediment, terminating with lions' heads at its angles; antefixas are

here terminations of the covering tiles and ornament the cornice on the sides. The coffers are not all of similar form; square ones (of different sizes) alternate with those of lozenge shape. ¹⁹¹

Note 191. For the origin of the plan, see Laumeister. Vol. 3, p. 1319 - 1324; and concerning the primitiveness of the Corinthian column, see *Annal. d. Inst.* 1865. p. 43, 61.

8. The Temple of Athene on Cape Sunion was a peripteral structure with 6 columns on the facade and 13 on each side. Those existing are of slender proportions, nearly 6 lower diameters high and with a noble treatment of the capital; 3 annulets enclose the steep echinus; a single incision cuts off the necking; 16 flutes surround the shaft in an exceptional way. This temple had about the same dimensions as those of the Temple on the Acropolis of Egina, and it was built of white marble; of it there still stands, deeply corroded by the ocean breeze, 11 columns of the colonnade and an anta with the column appertaining to it, all supporting architraves. Numerous remains cover the ground; 7 courses of the carefully joined substructure are exposed at one side. See in Mitt. d. Kais. Deutschh. Arch. Inst. (Athen Abt. Athens, 1884) Dörpfeld's report of the excavations and his drawings (Pls. 15, 16; pp. 324 - 337), according to which the plan of an earlier temple of porous stone was found beneath the marble temple, whose stylobate and steps were even better preserved than those of the later temple. Nine columns still stand upright and support a portion of the entablature. the plan of the interior of the temple can no longer be determined.

The sketch published by Blouet at the time is to be regarded as in general satisfactory. As already stated, the building might be contemporary with the Theseion at Athens.

9. The Propyleion at Sunion is a simple hall-like structure with columns-in-antis at both pediment ends and triple doorways.

10. The so-called Hall in Thoricos is a peripteral colonnade of 7 x 14 columns, whose purpose as a temple is not settled. Remains of columns show the flutes still unfinished.

6. Late Doric Style.

156. Characteristics.

The late Doric style abandons in great part the expression of a "typical monumental exaltation" and opens for itself new paths of development in the direction of "light decoration and graceful attraction". The columns become very slender and almost attain Ionic proportions; the echinus of the capital exhibits a lower and nearly straight profile; the annulets become very delicate, the single incision for the necking remains or is omitted; the entablature is correspondingly light in its arrangement. On structures belonging to the end of this period, the agasus of the capital usually receives a crowning ovolo moulding; the annulets frequently give place to small doubled astragals, the grooves of the triglyphs exhibit various dry or labored terminal forms, the surfaces of the triglyphs are used for an overloading with figure or vase ornament; the head-band of the triglyphs and metopes also receives a small ovolo moulding; the mutules disappear in elevation on the undercut surface of a water drip.

157. The Monuments.

1. The Temple of Zeus at Nemea (date of its construction unknown) is a peripteral structure with 6×13 columns on a stylobate of 3 steps, the cella with pronaos and posticum in-antis being built of grayish white crystalline limestone, now covered with a dark lichen on a weather-worn surface.

The columns are slender, have a slight entasis, and are constructed of separate drums, whose lower diameter has the considerable magnitude of 5.15 ft.; 20 flutes enclose the shaft; the echinus of the capital is low and steep, and is decorated by 4 annulets. Three columns are still standing, two of which belonged to the pronaos and now support a fragment of the entablature, a cracked architrave block with a shattered triglyph above it, which with one adjacent metope is made from a single block, while the other abuts against it. Hence the complete triglyph frieze was extended above the pronaos. The pavement of the temple is still preserved and is entirely covered by massive fallen ruins. The details do not appear entirely flat, however, and the ruins still leave an imposing impress-

impression on the observer.

2. Of the Temple of Nike at Messana, the fragments scarcely suffice for determining the arrangement of the temple. The columns were diminished but little, the echnus was steep and straight with 3 annulets. The abacus was crowned by a moulding; there was no incision at the necking; the mutules of the cornice were sunken.

3. The Portico of Philip on Delos exhibits proportions and treatment of details similar to those described under 1 and 2.

4. To the 4th century B.C. must also belong "a great Temple (shown by the excavations to be small) in Olympia in the Doric style, and which has the name of Matroon", by Pausanias said to contain the statues of the Roman emperors, and a Temple in Lepreon, that agrees with former in a high degree in both dimensions and shape.¹⁹²

Note 192. See Mitt. d. Kats. Deutsch. Arch. Inst. Athen Abt. Vol. 16. p.259, 260. Athens. 1891.

5. The Propyleion in Eleusis was built of Pentelican marble and was a bad imitation of the Athenian. The detail on this was frivolously executed and was no longer delicately designed. Further:--

6. The Stoas of the Pergamenian princes, that of Aitalos in the Ceramæikos, and that of Eumenes II between the Theatre of Dionysos and the Odeion in Athens, only the substructures and fragments of both being preserved.

7. The little Sanctuary of Esculapios and of Themis on the way from the Theatre of Dionysios to the ascent to the Acropolis, whose remains were recently laid bare by the removal of the rubbish heaps on the southern side of the rock of the Acropolis. The capitals found there partly have crowning mouldings on the abacus and partly astragals instead of annulets.

8. The Market Gate in Athens, a beautifully executed marble structure, built between 12 and 1 B.C., of which 4 columns and one anta still exist, together with the entablature resting upon them, and the pediment, whose cornices have partly fallen; according to the inscription on the Architrave, it was built with funds given to the Athenian people for the purpose by Caesar and Augustus, and it was dedicated to Athene

Archegetis. The columns are slender, like those of Nemea, are slightly diminished and have little entasis, standing with intervals of unequal width, leaving a central passage as in the Propyleions, and with the same arrangement in the frieze. 20 flutes surround the shaft, constructed of 6 drums; the echinus of the capital is rounded and low. On the apex of the pediment stood a statue of L. Caesar, grandson of Augustus.

9. Doric ruins on Samos, whose original purpose is unknown, show columns with Ionic bases, abacuses; triglyphs and metopes with a crowning moulding, and sunken mutules on the cornice.

10. On the fragments of a structure on the Agora in Priene, the flutes are separated from each other by broad fillets and end square; beneath the echinus are two astragals; the abacus has a crowning moulding (Fig. 151) with a similar one on the triglyphs and metopes, the first of these showing peculiar endings for the angle channels. The mutules on the cornice are also sunken here.

229 11. The remains of the Temple at Myus (Asia Minor), which indeed come from a small temple-in-antis, in part exhibit forms allied to those described under 9. The city was already so much destroyed in the 2d century A. D., that the Temple of Dionysios of white marble was the only building still standing. The regulae are not returned on the angles of the latter, and a drop is placed at the angle. The metopes have no separate head-band, like the triglyphs, but only a crowning moulding, and are broad in comparison to the triglyphs. On one block, the grooves of the latter are formed without coves; on another, they show a triangular treatment on the angles. The mutules of the geison are also wanting on the last block, while they are again sunken on the former. (See Fig. 151 in reference to the capital).

12. The Capitals of the columns of a two-story colonnade in Solunto (Sicily) exhibit the same low echinus as on the monuments described, with a unique termination of the flutes and 4 graceful annulets.

230 13. Semper likewise places here the Portico of the Peribolos of the Doric Temple at Pompeii with its peculiar profiles of strongly Ionic tendency.

14. Of the buildings of the Sicilian Tyrants, there have come down to us in the parts of a stylobate of steps and a Doric entablature, the remains of a colossal altar structure, which was a stadium in circumference, and was erected by Hiero III in Syracuse (275 - 215 B.C.). Of architectural interest is the statement that Hiero's magnificent colossal ship had atlantes figures 6 yards high, which supported a triglyph frieze and a balustrade.

15. The so-called Hall of the Bulls on Delos, on the east of the great Temple of Apollo, extends from north to south with a length of 220.42 ft. and a width of 29.06 ft. The building is ascribed to the best period and is the one best preserved on Delos. The enclosing walls rest on three marble steps, still partially remaining, that are built on a foundation of granite and extend along both sides and the northern end of the building, while a Doric portico was placed before the southern end (Fig. 152, from a drawing by Nenot). The interior consisted of a very long hall with a basin sunk in its floor and a shorter room, in which an altar actually stood. The two apartments were separated from each other by a row of piers with half columns, whose capitals consisted of kneeling bulls and of the normal Doric capital (Fig. 153). According to the later excavations and researches, the use of the bull capital earlier published by Stuart and Revett is to be accepted no longer. (Also see the Roman Theatre in Verona).

In the northern part of the hall must have stood the horned altar of Apollo (keratinos bomos), once esteemed by the ancients as one of the seven wonders of the world. The internal walls were perhaps decorated by a continuous frieze, fragments of which are still preserved in the Museum at Mykonos.

16. The Heraion in Argos.

An upper terrace, whose southern side was built of massive and almost entirely rough blocks of conglomerate, bore the old Heraion. The older Temple was burned in the 89 th Olympiad and was rebuilt by the architect Eupolemus under the direction of Polycleitos, who made the famous chryselephantine colossal statue of the goddess for it. The walls of the cella consisted

of whitish gray limestone. The temple itself appeared as a Doric hexastyle peripteral structure furnished with rich figure decoration in Parian marble, likewise showing this material in the metopes, pediment, on the roof and gutter cornice. A piece of this cornice shows anthemion ornaments, between these being a small bird. In the source mentioned below, the lower diameter of the column is given as 4.26 ft., the width of the flutes as .66 ft., and the masonry is said to have been covered with a coating of stucco.

Note 193. Scavi dell. Heraeon Argive. Lett. al Dr. Henzen da Bursian. Bull. d. Inst. 1854. Part 2.

Note 194. Later notices referring to this building are to be found in Bursian, C. Geographie von Griechenland. Leipzig. 1868. pp. 47, 48, et seq.

7. Recent Discoveries.

158. Monuments.

1. The old Temple of Athena on the Acropolis of Athens was excavated in 1886 by Kabbadios and Dörpfeld. The temple consisted of the peripteral portico, the vestibule, the 3-aisled cella, and the opisthodom with two treasure chambers. The foundations of the cella and opisthodom are built of the solid blue limestone of the Acropolis, and those of the outer colonnade and of the stylobate are of Piraeus limestone; according to the finds, the other parts of the building were of porous limestone, the pediment cornice, roof tiles and metopes being made of white marble. The temple was a peripteral structure with 6×12 columns, according to the restoration by the investigators mentioned. (Fig. 134).

The structural parts were partly built into the front wall of the Acropolis, and were partly found in the excavations. They are combined on the plates mentioned below to form a whole in a credible manner. The columns had 20 flutes, 4 annulets, and 4 incisions; the depth of the foundations vary about 9.84 ft.; the temple stood on a single step.

Note 195. See Mitt. d. Kais. Deutsch. Arch. Inst. Athen Abt. 1885. p. 275; 1886. p. 337; also Antike Denkmäler pub. by Kais. Deutsch. Arch. Inst. Vol. 1. Berlin. 1887. Pls. 1, 2.

Note 196. See Dörpfeld & Petersen. Baugeschichte des Temp-

Tempels. Mitt.d.Kais. Deutsch. Arch. Inst. 1887. p. 337 - 351; 1887. p. 25 - 61, 61 - 72. -- The entire building was termed "Hekatompedon" in the 6th century; its rear portion served as a "tameion" and contained several chambers. See Lölling; Mitt. d. Kais. Deutsch. Arch. Inst. Athen Abth. Athens. 1890. p.627; also Dörpfeld, same, p. 420 - 439; further, Hermes, 1891, p.472.

2. The Temple of Apollo on Delos was a Doric building with 6 x 13 columns from the end of the 3d century, the ceiling of its portico being entirely constructed of wood and not of marble. The ceiling of the front portico contained 15 coffers, formed by intersecting transverse and intermediate beams, and 3500 drachmas were paid for it. The vestibule walls were covered by thin elm boards, which projected but little from the face of the wall.¹⁹⁷

Note 197. See Homolle. Comptes et Inventaire des Temples Delianr en l'annee 279. Bull. d. Corresp. Hell. Athens and Paris. 14th year (1890). p. 462 et seq.

3. The Sanctuary of Leto on Delos was a small structure of similar style and age.¹⁹⁸

Note 198. See also; Zeit. f.Bild. Kunst. 1885. p. 202.

4. The Circular Building of Arsinoe on Samothrace. Aside from the foundations, not a stone of the circular structure remains on another. The building was perfectly circular; the chief parts of the superstructure were executed in white marble, consisting of a substructure of smooth ashlar and of a series of free piers set thereon, which supported the entablature and the conical roof; marble slabs filled the spaces between the piers. The latter exhibit the form of Doric antae externally, while Corinthian half columns are attached to them inside. The external entablature was also Doric, and it shows undeveloped Ionic forms internally. According to Niemann's drawings, a light cap and a frieze of palm leaves extends between the substructure and the series of piers., around both the interior and the exterior, its remaining portions having both sides wrought from the same block of marble. The numerous fragments found of a second similar frieze must belong to the socle. The height of the ashlar substructure cannot now be fixed, and the data for the mode of construction of the roof are likewise lost. We find in this example also, as in all circular temples cited,

that the Corinthian order was employed in the interior.

Note 199. See Gonze & Bensedorf. Untersuchungen auf Samothrake. Vol. 1. Vienna. 1875. pp. 79 - 87; pls. 54 - 67.

5. The Temple of Dionysios in Pergamon was a tetraprostyle structure, the shafts of its columns being covered by 20 flutes. It is an interesting example of the free treatment of forms in the Hellenic period. ²⁰⁰

Note 200. See Deutsch. Bauz. 1885. p. 175. Also, Bohn. Dritter Verläufige Bericht über die Ergebnisse der Ausgrabungen zu Pergamon. Jahr. d. Preuss. Kunstsaml. 1889. p. 38.

6. The Temple of Athena in Pergamon. A peripteral building with apparently 6×10 columns, pronaos and opisthodomos, and of the 4th century. The columns diminish with slight entasis from 2.463 ft. lower, to 1.984 ft. upper diameter. The drums were dressed smooth and the flutes were merely commenced on the capital block. ²⁰¹

Note 201. See Alterthümer von Pergamon. 1875. Vol. 2. p. 5 - 25.

7. The Temple of Demeter and Kore in Aegae was a small antae temple 31.82 ft. long and 21.32 ft. wide. The lower diameter of both columns was 1.87 ft., and their shafts were covered by 24 flutes each. The inscription found indicates by the forms of the letters the 2d century B.C., with which the dry architectural forms agree. ²⁰²

Note 202. See Bohn & Schuchardt. Alterthümer von Aegae. Berlin. 1889. p. 41 et seq.

8. The Temple of Athena Alea in Tegea. A peripteral temple with 6×13 columns, on which all three orders were employed. The exterior had Doric columns, the pronaos Corinthian, and the cella Ionic columns. It was not the largest temple in the Peloponessus, as Pausanias incorrectly states. ²⁰³

Note 203. See Adler. Der Tempel der Athena in Tegea. Cent. d. Bauw. 1882. p. 92, 97. Also, Mitt. d. Kais. Deutsch. Arch. Inst. Athen Abth. Athens. 1883. Pls. 13, 14; 1880. Pls. 2, 3, 4.

9. Temple of the Kabires on Samothrace. The peculiar ground-plan is given in Fig. 134 in the comparison of the kinds of temples, and it is to be made especially prominent, that the longitudinal axis of the temple extends from north to south. The cella

walls are built of thin and high courses, and the columns are constructed of single drums. The facade of the temple has the greatest similarity to that restored from the ruins of the Temple of Nemea. The rich ornamental acroteria of the pediment is interesting.²⁰⁴

Note 204. See Archaeologische Untersuchungen auf Samothrake. Vols. 1, 2. Vienna. 1875 and 1880.

10. The Grecian Temple in Pompeii. A peripteral (pseudodipteral ?) structure with 6×11 columns, a small cella and pronaos, on a substructure measuring 88.64×56.42 ft. The shafts of the columns were surrounded by 18 shallow flutes, not carried down to the step of the stylobate, but ending on a narrow band. Cavallari found the same arrangement on the Fountain-house of Cyane, which had a band $4 \frac{1}{2}$ ins. high.²⁰⁵

Note 205. See Appendice alla Topog. Archaeol. di Siracusa. 1891. p 49.

The moderately rounded and projecting echninus is bordered beneath by a narrow fillet and a cove.²⁰⁶

Note 206. See Duhn & Jacobi. Die Griechische Tempel in Pompeji. Heidelberg. 1890.

23x 11. The Temple of Asklepios in Epidauros. A peripteral building of similar unusual proportions with 6×11 columns, that stood on a substructure of three steps, 80.36 ft. long and 43.3 ft. wide. The lower diameter of the columns was 2.95 ft.; the distance between their axes was 7.38 ft.; 20 flutes surrounded the shaft of the column. The temple building consisted of pronaos and cella, the opisthodom being omitted. The cella was not divided into 3 aisles on account of its narrow width. The roof was covered by marble tiles. The wooden doors had on their external sides a special decoration by ivory inlays (see the building contract). Theodotus was employed as architect, Astias as assistant architect, and Timotheus as sculptor.²⁰⁷

Note 207. See Kabbadias in Praktika, years 1882, 1883, 1884, and the drawings therein by Dörpfeld and Kawerau; also Baunack's epigraphic essay; Aus Epidauros. Leipzig. 1890.

12. The Tholos in Epidauros. A circular structure by Polycleitos with a Doric portico and an internal Corinthian colonnade, from which comes the beautiful marble capital recently

made known.²⁰⁸ The French archaeologists see a Fountain enclosure in the peculiar course of the foundation walls in the interior of the cella, this would otherwise be necessary to support the floor slabs.

Note 208. See Praktika, years 1884, 1885. Reconstruction therein by Dörpfeld. Also in regard to the capital; Ephem. Archaeol. 1885. Pl. 10.

13. The Choragic Monument of Nikias in Athens. This was a large structure with 6 Doric columns on the front; the dedicatory inscription is placed above the three middle intercolumniations. On the side facade was probably placed an angle column, and a second column beside it, while the remainder was occupied by an unbroken wall; the face of the rock probably formed the rear wall, as at the Choragic Monument of Thrasyllus.

The architraves consisted of white Pentelican marble, the triglyphs were of poros stone, while the metopes were thin slabs inserted in grooves, and the cornice was again of Pentelican marble. The building was crowned by a pediment, and this had the form of a temple; the so-called Beule's Gate was built of its ruins.

The Technics of the stonecutting and setting are not inferior to those of the buildings of Pericles; dowels and I-cramps alternate in fastening the stones together. On uncovering the doorway, many vestiges of painting were found on the parts of the building in question, especially of blue on the triglyphs and on the slabs in which the drops were cut.²⁰⁹

Note 209. See Mitt. d. Kais. Deutsch. Arch. Inst. Athen Abt. Athens. 1885. p. 219 - 230; pl. 7.

Chapter 2. The Ionic Order.

a. Development.

159. General.

The civilization of Assyria and of Egypt had already been highly developed for a long period before the forest covered shores of western Asia and of the islands adjacent thereto could exhibit results in the domain of architecture, that proved a similar culture and intellectual development of their builders, as in the countries first mentioned. Civilization

had indeed proceeded very far in both centres of culture, when it first commenced to dawn in Greece and Asia Minor.

Peoples emigrated from these centres at an early date, attracted by the favorably located plains of western Asia and the fine climate.

Fifteen centuries before Christ, we see the Egyptian princes of the 18 th dynasty undertaking campaigns into western Asia, also Sennacherib the Great two centuries later, and two centuries later still, a movement of the people from Asia toward Europe was reflected back from the neighboring European Greece upon the Asiatic islands and coasts.

The Aryan and Semetic races met and mingled there; Assyrians and Egyptians left their traces; the mobile Semites and the people of Tyre and Sidon there carried on traffic with distant races in the interior and on the coast.

Under such conditions, the art style that developed in this country received necessarily a peculiar stamp, but still lacked originality.

160. Wood Construction; Mixed Wood and Stone Construction.

For building, there existed in this province a superabundance of wood and of stone; Aryan wood construction and Semetic stone construction are here found beside each other. The ancient wood construction is proved by its imitations on the Lycian and Carian rock-cut tombs.

In the mixed construction, the walls were built of regular and irregular stones, the door and window frames, the ceilings and roofs, and even free pillars, were of wood, while the roofs were covered with mixed straw and clay, later with burned tiles. The easily wrought wood led to the use of sculptured ornament; its lack of durability required a protecting coating, which was in the form of a covering with color, as rich painting in striking hues, or it consisted of a covering of metal and terra cotta.

161. Proofs.

The massive quays, terraces, and stone rampart walls in western Asia, that supported the warehouses and storehouses of the Phoenician merchants, slightly built of wood or of mixed stone and wood construction, or served to form or protect harbors and landings, and the mighty temple terraces of Jerusalem, still

supply in their ruins eloquent evidences of the stone style of the Semites prevailing in western Asia at an early date. The element, to which these merchants owed their place and power, required massive and monumental fortifications against its might, as well as the prevalence of the easier use of wood in the preparation of the equipment for traffic. In their chief settlements, and with reference to their business and the manner of their acquisition of the country, it became necessary to see that it afforded both materials in abundance.

Certain Cypriote buildings likewise are evidence of a mixed wood and stone style, in which are found free wooden pillars between stone bases and capitals.

We learn from Strabo, that on account of the lack of stone in Babylon, columns were made of palm trunks, which were covered with reeds and stucco and then painted. The Bible informs us concerning the erection of the Temple and Palace of Solomon, that their foundations were "of costly stones, cut to the square, their wood-work sawn with saws, on all sides, from the ground to the roof."

The king of the Jewish people, skilled in stone construction, turned to the Tyrian Hiram with the request; "Command that cedars be cut in Lebanon---, for thou knowest, that there is none among us, who is skilled in hewing wood, like the Sidonians." He covered Temple and Palace with cedar wood, built "cedar" partition walls, wainscoted within the entire Temple with "cedar alone", ornamented it with turned knobs and flower-work, "so that no stone could be seen." He then covered the wooden portions with pure gold, had carvings executed thereon, sculptured cherubim, palms and flowers; the doors were carved in olive wood and overlaid with gold plate. The bronze-founder Hiram from Tyre, the son of a widow of the tribe of Naphthali, cast for him the two columns Jachin and Boaz, placed before the portico of the Temple, with their richly adorned bronze chapiters. He built his own Palace with "cedar" columns; its porticos were constructed of columns and heavy beams. (Kings; V, 6; VI, 10, 15, 16, 18, 21, 29, 32; VII, 6, 9, 15.

What has been deduced for Cyprus and the Asiatic coast east-

eastward thereof, may indeed be assumed also for the coasts of Asia Minor lying north and northwest.

162. Decadence of Wooden Architecture.

The original wealth of the country in wood was somewhat lessened in time by traffic in logs and lumber, by its use in building ships and structures, and by employment as fuel; moreover irrational or defective cutting thinned the forests; cedars, cypresses, and sycamores, were at command in ever lessening quantity.

These circumstances, combined with the lack of durability of this building material, in time permitted the richly abundant and more resistant stone to become more prominent, at first for structures serving for elevated purposes, and in this way the mixed mode of building gave place to one more nearly of stone. Meanwhile wooden columns were set on stone bases, that raised them above the damp pavement and thus protected them from dampness, or they received a protecting coating, before they gave place to stone pillars, to which the character of the former was transferred in both form and proportions.

163. Stone Architecture; Facades of rock-cut Tombs.

The date of the completion of the innovation can scarcely be accurately determined here; how it was completed may be seen on Lycian and Carian rock-cut tombs. The ancient terrace roof there first gave place to that with rafters or the gable roof; the closely set round trunks were replaced by squared timbers set farther apart; the old wooden pillars gave place to the columns, and the wooden abacus over these, to the volute capital. But these changes were not perfected before Lycia entered into closer relations to Greece, before it was incorporated in the Ionic satrapy (515 B.C.). The inscription on the Tomb of Amyntas is not considered earlier than 400 B.C., and it cannot be assumed to be a later addition.

As repeatedly explained, the tombs represent the habitations of the living, and in accordance with this law, the well built wooden cabin, slavishly imitated in the rock-cut tombs in even the smallest detail (both in relief as well as

if detached), prevailed, and with its wooden construction as well. Its structural elements were recognized on the tombs at the same time by Niemann and Dieulafoy (1884) and were technically explained, when they pointed out in the triple series of beams corbelled out at the ends and over the round ceiling beams, the ties preventing the sliding of the terrace roof, covered with rubbish and straw mixed with clay.

The erroneous idea of Semper can no longer be held, that the Lycian rock-cut tomb is to be regarded as a monumental funeral pyre, and to which we adhered for a time, in consequence of the preceding statement and of the most recent examinations of these monuments by Benndorf, Niemann, Petersen, von Luschan, as well as the conclusions and comparisons with ancient Persian architecture by Dieulafoy.²¹⁰ The temple facades of Lycian tombs (Fig. 154) cannot therefore be longer regarded as a transition stage of Ionic stone architecture. Their value to art history "will not be annulled thereby, scarcely be lessened perceptibly, but rather assured in the chief matter. They remain as proofs of an early phase of the development of the Ionic style,²¹¹ though not as originals, but rather as indirect copies".

Note 210. See Benndorf & Niemann. Reisen in Lykien und Karien. Vienna. 1884. Also, Petersen and von Luschan. Reisen in Lykien, Milyas und Kibyratis. Vienna. 1889.

Note 211. See Benndorf, p. 113.

The completed stone structures of the Ionic order owe their origin to a mixed stone and wood construction, just as already explained in the case of the Doric order, but with the difference, that the slender proportions of the wooden structural parts in this change, without requiring their transformation by the introduction of a foreign element, like the massive Egyptian stone columns. By a change in magnitude, the architectural members over the columns were retained with their original functions, when the new stone ceiling was allowed to rest on the architrave and was not, as in Doric stone architecture, raised to the height of the cornice, making its future position to be recognized ornamentally in the frieze.

164. Characteristics of the Order.

The characteristic peculiarities of the new order are then:-
 236 slender columns standing on separate richly moulded bases and accented by vertical semicircular flutes separated from each other by fillets, crowned by the volute capitals as shown, and spaced uniformly and further apart, but set vertically; a plain frieze, or one sculptured with figures, without architectural breaks; a simple projecting cornice with deeply undercut water-drip, and that sometimes rests on the well known so-called dentils, the placing of the beams of the portico ceiling directly on the architrave.

A frequently added criterion, "a wider and lighter architrave, columns further apart and more slender", is only true concerning the greater lightness of the former and the slenderness of the latter. On the boldest Ionic temple, that of Apollo Didymeos in Miletus, the columns stand closer from centre to centre, than at the middle interval of the Doric Propyleion in Athens; the intercolumniation of the heaviest Doric temple in the Peloponessus, that in Corinth, is equal to that of the Ionic colonnade in the Athenian Propyleion (Fig. 155).

165. Occurrence of the Order.

As already shown, the earliest knowledge of the countries of Asia Minor and of the adjacent islands extends back to about 217 the middle of the second thousand years B.C.: the earliest very simple architectural productions must indeed have been of native origin; the later received richer forms and changes through Phoenician, Assyrian, and Egyptian influences, and attained by the addition of Grecian elements a higher perfection of form. Transplanted to European soil, the treatment of details in the Grecian mother country reached the highest degree of perfection and refinement.

No Ionic monument of the earliest period, built of stone, longer graces the soil of Asia Minor; the natives of inner Asia, the Medes and Persians, pressing toward the sea, destroyed them; the greatest sanctuary, the earlier Artemesion in Ephesus, was ruined by the rude love of fame of a foolish man, even in the period before Alexander.

166. Remains.

With the exception of the Lycian and Carian rock tombs belonging here, all that has come down to us dates from the era of Alexander or that of the Diadochides. Likewise much from the period of Roman supremacy. Only on European soil, in Attic provinces, are preserved for us a number of charming creations from the highest period of Greek art, although even in ruins; in lower Italy and Sicily, we meet with but scanty remains, of which the best consist of some capitals of porous yellow limestone.

167. Material and Polychromy.

The remains of the monuments of this architectural style all indicate a perfected marble style; one seldom meets with structures of porous limestone coated with stucco, and these are mostly outside Asia.

The monuments of this style likewise were embellished with the gleam of rich gilding and the splendor of colors, as sufficiently proved by vestiges and by traditions.

168. Magnitude of Temples.

Without change or variation of details, the temples occur in all possible dimensions, from the smallest, chapel-like, 232 Temple of Nike Apteros at Athens to the gigantic structures of Miletus and of Ephesus. The same forms were employed at the small, as at the large scale, just as the case was in the Doric order likewise (Fig. 156).

169. Civilization.

Western Asia was the country in which Semetic and Hellenic civilizations most intimately combined. The information given by the Bible concerning the arrangement of Solomon's Temple must therefore accord in a higher degree with the Asiatic-Ionic temples, than with the Hellenic-Doric previously described.

Finally, if we confirm Braun's axiom, that "the Ionic style belongs to Nineveh, perhaps even to Babylon; for it was already the common style of Asia at an ancient date, not to be computed, - it is a powerful style, whose envoys may be traced into Asia Minor, along the Phoenician coasts to Carthage, and even into innermost Africa", we may reject the Vitruvian

fable of the invention of this style (Book IV, Chap.1) and his explanations of the volutes as coiled tresses of women's hair and of the flutes as the folds of garments.

b). Form and Construction of Main Parts.

Like the Doric, the temple of the Ionic order rises above the ground as a substructure of several steps and is substantially composed of the same elements, and is similar in plan or is allied to one of the developed schemes.

170. Substructure.

1. The substructure (Stylobate) in Attic Ionic monuments consists of 3 steps, either of plain form as in most Doric structures, or more richly treated by a recession, as on the little Temple of Nike Apteros in Athens (Fig. 157). We generally find higher substructures in temples in Asia Minor, following models in inner Asia. On the Temple of Magnesia, for example, these were arranged in 5 steps, at Aizani in 7, and on the Artemesion in Ephesus in 10.

Curvatures have yet scarcely been shown to occur in the stylobates of Ionic monuments. Athenian structures are free from them; but they are recently asserted to occur on the Ionic Temple or the terrace of the Theatre at Pergamon.

171. Cella Walls.

2. The walls of the cella do not rest directly on the pavement of the portico, but on a continuous richly moulded base, whose section is usually imitated from that of the bases of the columns; they are terminated or crowned at top by a cap, that in part shows the members of the antae capitals. (Fig. 158).

239 The walls are not inclined but are strictly vertical and are built of coursed stores, that exhibit on their beds and ends the same mode of working as the ashlar of Doric monuments, and which are connected together in the same manner by dowels and iron I-cramps (Fig. 159). On the Temple of Nike, the Temple of Artemis Leukophryne in Magnesia and others, the ashlar of the cella are all through stones; in Miletus, the middle of the wall consists of rough stone masonry; merely the external surfaces of the walls 8.95 ft. thick are formed of large blocks of grayish marble.

On the external surface, the height of the coursed ashlar

are to their length as 1 to 2.7 or 3.

The lowest course is in Athenian buildings higher than the others, just as in Doric (see Parthenon, Theseion, Paestum, and others), and it projects $\frac{3}{8}$ inch from the wall surface at the Eretheion. The fillet with the apophyge is there cut on this course (Fig. 160).

A fret band extends along at the height of the lower third of the columns on the walls of some temples in Asia Minor, as for example, in Aizani and in Ancyra.

The thickness of the walls is to their height usually from 1 to 11.5 to 1 to 13 (see Nike Apteros, Aizani, etc.); these walls therefore require less material and possess less stability, than Doric walls of equally careful construction.

172. Subdivision of Surfaces of Walls.

The decoration of the wall surfaces internally and externally by pilasters is permitted, as proved by the walls of the Temples at Miletus and those of the Propyleion at Priene.

240 The angles are specially accented by small projections, frequently of unequal width on the different sides (see Temple of Nike). the slightly projecting wall ends or antae, described in the Doric style, likewise occur here and are opposite the external or intermediate columns, or they increase to become massive piers, as on the north portico of the Eretheion and on the charming caryatid portico in Athens.

173. Doors and Windows.

3. Doors and windows exhibit openings of vertical rectangular or trapezoidal shape. The sides of the former either consist of plain vertical piers, which like antae are crowned by capitals and are connected at top by a plain lintel (Fig. 161), as for the doorway of the Caryatid Portico, or richly moulded jambs and lintel enclose the opening, as at the doorway of the north portico of the Eretheion. A broad band, decorated by flat rosettes similar to those usually occurring on Assyrian tombs²¹², is the principal member of the casing of the last doorway, and it is recessed toward the opening in moulded ogee bands ornamented by leaves. The rosettes on the bands of the jambs have instead of the low calices deeply drilled holes, that may have served for fastening a movable ornament. It is



singular to find in the midst of the exquisite and marvellously executed sculpture the setting bosses remaining below the second rosette of the left jamb. On the right and left of the lintel project from the wall magnificently wrought volute-consoles, models in design and execution, and they receive the cap, which consists of cornice, carved lower member (egg-and-dart moulding) and the cyma ornamented by anthemions; these parts compose in construction, in form and proportions, one of the most beautiful doorway enclosures of all times (Fig.162).

Note 212. See Dieulafoy, Vol. 2, p.31.-- 'Already at Mycenae was the doorway to the recently more carefully explored second "Tholos" similarly enclosed. See Ephem.Arch.1891.Pl.1.

A similar treatment is also found on one of the Ionic rock-cut facades of tombs in Telmissos; instructive there is the false bronze or wooden door with its architrave, panels, knobs and nails, imitated in stone.

247 Another rock-cut tomb in Antiphellos shows the architrave of the door with the strongly marked, so-called "ears", with an ogee moulding extending around it and three bands, a treatment that we meet with again on the windows of the western side of the Eretheion, in simplified and ennobled form.

It is worthy of note, that in all the cases mentioned, the mouldings are carried down to the base or sill and are not returned or extended horizontally.

The window sills on the Eretheion are simple and plain, shaped like a rectangular plinth in section, furnished with a groove and a hole for inserting a plate for closing it, and which may well have been of perforated or thin polished marble, like what may now be seen in old Italian churches (S. Miniato and Criveto).

174. Columns.

4. The column consists of the base, shaft, and capital, and it is not inclined toward the wall of the temple, as in the Doric order, but is set strictly vertical. It is diminished less than the Doric column, has a scarcely measurable entasis, rising in slender form like its wooden prototype to a height of 8 to 10 times its lower diameter. Including plinth, the lower diameter of the column is to its height as follows:-

Temple of Athena in Priene.	1 to 8 $\frac{1}{3}$.
Propyleion in Priene.	1 to 9 $\frac{1}{3}$.
Temple of Apollo in Miletus.	1 to 9 $\frac{1}{5}$.
Propyleion in Athens.	1 to 9 $\frac{1}{6}$.
Temple of Apollo in Phigaleia.	1 to 9 $\frac{1}{2}$.
Temple of Zeus in Aizani.	1 to 10.

242 The height of the base (exclusive of the plinth) is less than or equal to the lower radius of the column; the height of the simple capital (measured from above the volutes) is somewhat more than that radius; if a necking ornamented by anthemions is arranged, as on the Erectheion, then the height of the capital (measured from the top of the abacus to the bottom of the astragal) is about $\frac{3}{4}$ the lower diameter, or is equal thereto, as on the Temple in Phigaleia.

Twenty-four flutes of semicircular or oval horizontal section, separated from each other by narrow fillets, surround the shaft of the column and terminate in semicircular form at top and bottom, passing into the apophyges.

On the older monuments, the base consists of a slightly concave block of circular form, fluted horizontally or decorated by astragals and scotias, and which rests directly on the uppermost step of the stylobate and supports a torus likewise fluted, from which a small round with fillet and apophyge forms the transition to the shaft of the column (See Samos and Priene). The bases of some temples have only the lower half of the torus fluted (see Priene), while the upper half is left smooth in the circular form. This expresses no diversity in the mouldings, for such a base is merely not entirely finished; to avoid any injury to the delicate fillets, their working was deferred till the entire completion of the building, and then frequently lack of means occurred, or they were intentionally omitted, since mouldings on these exposed places were scarcely to be insured against injuries. Color might easily restore the harmony, i.e., painted flutes might replace sculptured ones. The lower half must be entirely wrought before setting, since it was practically impossible afterwards to get at it with tools, while the later working of the upper half presented no difficulties of any kind. Many of these bases were then set on square plinths,

especially those in Asia Minor, as in Aphrodisias, Aizani, Teos, Priene (Propyleion), and thus removed from contact with the stylobate. The France excavations undertaken in Miletus some years since yielded even polygonal plinths, ornamented by reliefs and placed beneath the bases of the columns (Fig. 163).

The bases in the interior of the Temple at Phigaleia are of more expanded form with a strong apophyge; a beautifully perfected and refined form is shown by those of the Attic monuments on the Acropolis of Athens. Without plinths, if the circular socle of the Ionic columns of the Propyleion in Athens be not so considered, they stand directly on the stylobate and are composed of a large torus, fillet, scotia, fillet, a smaller torus with fillet and an apophyge. The toruses are partly formed like a group of small astragals, are fluted like the columns but here horizontally, or are covered by interwoven ornamentation (Fig. 163).²¹³

Note 213. On the Erechtheion, the bands of the intermediate columns of the north portico are bordered, but are sunken on the antae and the angle columns.

Corresponding to the more luxuriant forms of the architecture of Asia Minor, the bases at Miletus have the torus covered by overlaid scales or foliage, or they are decorated by scroll and anthemion ornaments.

175. Capital.

Wherever in Asiatic wooden architecture the straight wooden beam occurs with the isolated support, the column, an abacus is interposed²¹⁴, that is variously ornamented, for example on the Tombs of the Persian Kings²¹⁵, like the figures of bulls projecting on two sides and which support on their backs a projecting transverse beam. A transitional form between a corbel and a detached support is not interposed, but the columns terminate directly under their loads.

Note 214. See Dieulafoy. Vol. II. pp. 46, 47.

Note 215. See the same, p. 31.

Other terminal forms with corbels are shown by a rock-cut tomb at Limyra;²¹⁶ both ends are formed as volutes in the preferred archaic Assyrian spiral shape (Fig. 164).

Note 216. See Petersen and von Luschan.

As the decoration of a capital, the spiral form is found on Assyrian relief slabs, Phoenician stone structures, Cypriote steles, ivory pieces from Nineveh, ancient Persian columns, and on wooden chests, exactly like the corbels of Limyra in meaning, as shown on ancient half-timbered houses of our time, as in Fig. 165, taken from a wooden house of the 17th century in Maurach on the Bodensee, (Lake Constance).

217. Hittorf and Viollet-le-Duc indeed stated these facts long ago in their explanations of the Ionic capital and accept the carved, or carved and painted, abacus as its primitive motive. its form is translated into stone with reference to the properties of the material, thus avoiding too great projections sidewise, and becomes the columnar capital, especially if a suitable ending be added to the top of the shaft.

Note 217. See Hittorf. *Recueil des monuments de Segeste et de Selinunte*. Paris. 1870. pp. 266 - 334 and pl. 82. -- Fuchsstein, O. in 47th Program for the Winkelmannsfeste of the *Archaeol. Gesellsch. in Berlin*. Berlin. 1887. No. 21. -- Bohrmann in *Jahrb. d. Kais. Deutsch. Arch. Inst.* Vol. 2, p. 273 - 285. Berlin. 1889. -- *Antike Denkmäler*, published by Kais. Deutsch. Arch. Inst. Vol. 1, pls. 18, GI. Berlin. 1888. -- Lastly, Koldewey, pl. 16.

This supposition obtained increased probability by the peculiar capitals published by Hittorf²¹⁸; it has become a certainty during recent years from the finds on Lesbos, in the Troad, and especially on the Acropolis of Athens. According to the latter, we should regard the Ionic capital as being composed of two parts; of the crowning annular mouldings of the shaft of the column, and of the undercut abacus with the characteristic endings mentioned. The artistically perfected combination of these two parts and their union was the problem, that Grecian architects eventually knew how to solve in such a marvellous way.

Note 218. *In Restitution du Temple d'Empedocle a Selinonte ou l'Architecture polychrome chez les Grecs*. Paris. 1851. Pls. 3, 4. 176. Earliest Types of Capitals.

a). Just as in Persian buildings, there is wanting in the earlier Grecian volute capitals any transition from volutes to

column; the lower base of the former rests directly on the latter. On the capital, the lines of the volutes were not yet expressed by sculpture; they were either merely scratched in or painted in colors and were but loosely connected with the outline of the capital. (Fig. 166).

b). Another type is found on Lesbos and in the Troad, which seeks a combination of capital and column by means of certain scallops. The circular upper end of the shaft is continued in the capital and is carved in expanded form with the abacus coiled upwards, so that the volutes are already sculptured. (Fig. 166). The form of the capital is strongly oblong in form, and the abacus being the same thickness as the shaft, these permit an archaic wooden form to be recognized without difficulty.

c). A third, and the latest of the ancient types, shows the shaft crowned by a recurved ogee moulding, recalling the crown of a mushroom, on this being laid or imposed the oblong abacus, this projecting so far as the inventor judged the combination of the two forms to be sufficient for his purpose. (Fig. 167).

247 It is but a step from this last type to the developed Ionic capital of Mnesicles, even if various fanciful forms were possible between the two, that chiefly concern the form of the ending of the shaft and soon appear as a band, torus, Lesbian cyma, or as a combination of the two, until this finally clearly becomes the Doric cyma.

177. Attic Ionic Capital.

The capital of the perfected Attic Ionic style, when used on a peripteral structure, chiefly retains the same form, that was found over the rock-cut tombs in Antiphellos. As in the base below, the column likewise expands in the capital above and generally terminates in a projecting round with a small fillet beneath, and frequently with a second above it. This astragal is in most cases wrought in the same block with the shaft or the uppermost drum of the column, and on it there rests upon it the volute capital, also wrought from a single block, whose spirals descend towards the middle of the column; this downward direction personifies the "spring-like movement of

the curve". Beneath the depression of the volutes, but not touching it, lies a quarter-round projecting beyond the face of the spirals, ornamented by carved or painted egg-shaped leaves.

Above the capital is a rectangular abacus, profiled like the echinus, either left in plain form or decorated by leaves. Upon this slab rests the architrave. Surfaces are raised $1/25$ inch above the astragal and also above the abacus to prevent breaking off the delicate projections in setting the heavier parts) See Propyleion in Athens and Fig. 168).

On most buildings in Asia Minor (which certainly belong to a later period), the beautiful elastic lines connecting the two volutes together disappear and give place to a straight and dry connection (Fig. 168). The sides parallel to the architrave exhibit entirely similar forms; those at right angles thereto are again similar to each other, but are different from the front surface, cushion-like, contracted toward the middle, calyx or bell forms, decorated by astragals and hollows.

For a richer treatment of the capital, as at the Eretheion, there is also added a special necking member ornamented by vertical anthemion ornament, and above the quarter-round is a round decorated by interwoven work; the latter is then wrought on the capital, while the quarter-round with the necking on the uppermost drum of the column consists of a separate block.

But the anthemion on the necking of the capital is likewise appears on the fragments of the temples in Naukratis, on Samos, and in very recent years on the columns of the Temple in Lokri. While this is on the Eretheion separated from the flutes of the shaft of the column by an astragal, we find in the latter a contraction between flutes and anthemions, since the downward points of the foliage lie in the spandrels of the arches terminating the flutes (Fig. 169).²¹⁹

Note 219: From Mitt.d.Mais. Deutsch. Arch. Inst. Röm. Abth. Rome. 1890. pp. 192, 193.

The spirals move in delicately curved lines in several coils, that cannot be described by compasses, and end in the so-called eyes. The outlines of the spirals are bordered by an outward-

outwardly curved border, single or double (see Propyleion, Erechtheion) and their surfaces are correspondingly hollowed out once or twice. In the richly shaped capitals, the turns of the volutes are separated by rectangular grooves or are joined with the spiral borders by delicate rounds.

178. Treatment of the Angle.

The vacant triangular space, produced at the points where the spirals separate from the depressed middle portion, is usually concealed by a small palmetto ornament; where this is not the case, as on the magnificent capitals of the Erechtheion, bronze nails in the outlines of the volutes indicate that gilded bronze palm leaves were inserted therein (Fig. 170).

179. Eyes of the Volute.

The eye of the volute is treated as a strongly projecting rosette decorated by leaves, or its place is merely marked by a rudely wrought hole, indicating that a metallic ornament was fixed there, as shown by marks on the Erechtheion, on the Temple of Cybele in Sardes, and on the Artemesion in Ephesus.

180. Band joining Volute.

The downward curve at the centre does not in all cases remain without ornament; remains in Attica exhibit an interruption at the middle with an upward curvature of the surken border of the spiral, from which spring scrolls and palm ornaments (Fig. 171). On the Temple of Cybele in Sardis, ²²⁰ the band is ornamented by a rose, from which scroll ornaments extend to the right and left (Fig. 175).

Note 220. See Durm. Ionische Kapitele aus Kleinasien. Zeit. f. Bauw., 1876. p. 565. pl. 69.

The bolster at the side either retains its plain cut or bell shape, similarly enlarged from the centre toward right and left, or hollows and astragals, smooth or set with beads, ornament it, following the curve of the outer spiral, or merely the centre is masked by an ornament (see Miletus), or the surface of the bolster is covered by scrolls and palm ornaments (see Priene and Sardes), or the bolster is composed of two acanthus cups united at the middle, from which reed-like leaves extend to the outer spiral margin and border it like lace, as may be seen on a single capital found on the Acropolis of Athens.

A capital found near Ephesus, that exhibits spirals and egg-and-dart mouldings wrought with extraordinary beauty, has at the sides the heads of bulls looking outward from the balusters, which were moreover not intended to support a load, just as was the case with its prototypes in inner Asia. (Fig. 175).

Note 220. See *Durm. Ionische Kapitelle aus Kleinasien. Zeit. v. Bauw.* 1876. p. 565; pl. 69.

182. Angle Capital.

However perfected the Ionic capital must be termed, when employed between antae or in the line of direction of the architrave, it was just as unsatisfactory at the angle of the peripteral arrangement, where the two architraves are at a right angle.

250 The front surfaces of the volutes parallel to the architrave are bent outwards at 45° on one half to avoid being spoiled; the inner volutes but partially appear as far as the eyes and intersect each other at right angles in an ugly manner, while the baluster sides are left tolerably complete in the original shape. The abacus must follow this amalgamated form of the capital, since its rectangular shape is dropped and it receives on the external angle an outwardly curved, cut off point, and on the internal one a small reentering angle. (Figs. 172, 173).

251 What makes the Doric capital so convenient for the peripteral arrangement, its uniform and ready usability in every place, was wanting to the Ionic after its development, and even the Hellenic genius, skilled in forms, could not create any satisfactory result in the development of a special angle capital.

It is worthy of note, that on the Ionic capitals of the best period, the angle palm leaves of the volutes are placed in the triangular space above the cymatium, as on the ancient stela capitals, while they are later dropped on the cymatium. (See Sardes, Priene, Halicarnassus, Pergamon, Didymaeon, Teos, and the Ptolemaion on Samothrace).

A rather foreign treatment is shown by the Ionic capitals from Soluntum in the Museum at Palermo, on which instead of the angle palm leaves, tall upright anthemions are arranged as if intersecting the capital. (Fig. 174).

A more convenient peripteral use led ^{and} in the late period) to Ionic capitals with volutes on four sides, examples of which are given by Fig. 174. We find them common in Pompeii with polychromatic finish and with the characteristic eggs-and-darts on the low cyma, as if in thin metal. The volutes are then colored light blue on the front surfaces and yellow on the rear side. ²²¹

Note 221. See Damiani-Almeyda. G. Institutions Architectoniques et ornamentales sur l'Antique et sur le Vraie. Pl. 10. Palermo. 1884.

183. Painting.

Even if the Ionic capital was already of richer design in form than the Doric, this richness was yet enhanced by the sculptured ornamentation, that covered all its members and attained the highest degree of its decoration by the painting of the latter. (See the plate opposite printed in colors).

Vestiges of this are well preserved in many cases on Athenian capitals and on separate capitals, whose use remains unknown. We should conceive the marble to remain unpainted or to be colored by the transparent, light yellow local tone, the egg-and-dart mouldings of the abacus and of the cymatium to be gilded, together with the beads, the borders of the volutes executed in deep red and gold, the bands separating the volutes being a rich blue, on which ground the gilded bronze ornaments laid thereon were sharply raised, and the nails at the intersection of the gilded interwoven bands on the round appeared in shining colored enamels. The gilded anthemion ornament of the necking rose from a red ground; the bases also exhibited similar colored ornamentation. ²²²

Note 222. See coincident reports on the painting in Allg. Bauz. 1881. p. 350.

On one of the ancient Athenian stele capitals, the volute lines are green, the eyes of the volutes are red, the cymatium is painted with red and green leaves; on another, the spiral lines are reddish-yellow, the eyes are purple, and the bands and palm leaves are red and white; on a third, the fret on the abacus is green on a red band, the eyes are green, and the leaves are alternately red and green.

Hittorf²²⁸ colors the volute lines of the archaic volute capital red, the eyes and palm leaves alternately blue and red; on another, the spiral lines are likewise red, the cymatium has blue and green bordered leaves on a brownish-red ground, the abacus fillet is green, and the volute eyes have yellow rosettes on a blue ground. Hittorf's statements agree with a drawing of the same capital made in the year 1839 by Hochstetter (in the Collection of original drawings of the Bauschule at Karlsruhe).

Note 228. See the same work and place.

Le Bas colors it in a scarcely probable way, making the spiral lines blackish-brown, the volute eyes red in one case, yellow in another, and the leaves light blue and white on the light yellow local tone of the capital.

Another peculiarity on the Ionic capitals of the Athenian propyleion remains for consideration; only the front egg-shaped leaves between the volutes are sculptured, while those beneath the balusters in deep shadow are merely wrought in outline and lack their completion in relief. (see Fig. 168). We scarcely have to do here with something "unfinished", but with a well known "so far and no further", since the apparently incomplete leaves too plainly show the vestiges of former coloring in the border around them. It was probably believed that in this place, hard to reach with the chisel, the necessary effect could be produced by color.

But these capitals also exhibit iron pins inserted over the free portion of the cymatium, which were indeed intended for fixing external ornamentation, just like the small iron cramps on the balusters of the capitals of the Eretheion.

184. Columnae Caelatae.

Besides the simple fluted shafts of columns, there also occurred others on the Artemesion in Ephesus decorated by sculptured figures. (Fig. 175).

Figures of life size in strong relief surrounded the shaft above the base; an astragal separated the lower portion from the flutes. These columnae caelatae were represented on Persian coins of the imperial period; after ten years of toil, fragments of them have been brought to light at the place it-

itself, which is due to the Englishman Wood. The magnificent remains of the figures on the columns are exhibited in the British Museum in London (see the shaft of a column drawn after these in Fig. 175); at the place and site, nothing was left, except the great trench, a few drums of columns and unimportant fragments.

A commencing point for the arrangement of such figure decoration of pillars executed in relief was afforded before the finds in Ephesus by the support of a throne of Zeus, drawn in Fig. 175, and which is preserved in the Museum at Palermo.

To the columns of the later Artemesion have also been added the fragments of the earlier Temple, dating from the era of Croesus, that are exhibited in the British Museum, and which show how these earlier art periods treated the columnae caelatae (Fig. 176). Not all the shafts in this Temple exhibit the figure decoration, for the flutes on some extend entirely to the base. Of great interest are likewise the fragments of capitals, from which their form may be determined with tolerable certainty. The volutes show similar profiles, as on the Temples of Messa and Lokri, while small astragals separate the convex surfaces of the volutes from each other; the volutes project strongly sidewise, while the eye falls far outside the extended line of the shaft. No less important are the fragments of the cyma; obliquely inclined slabs were bordered above and beneath by projecting rounds and decorated by lions' heads, between which were arranged small figures.²²⁴

Note 224. See Murray, 'A. S. Remains of archaic Temple of Artemis at Ephesus. Jour. of Hell. Stud. Vol. 10. (1889). p. 1-10; Figs. 1-5.

185. Construction.

The columns of the different temples were sometimes monolithic, sometimes composed of separate drums, just as the peculiarities of the material required. Thus for example, the columns in Aizani were marble monoliths 27.95 ft. high; but those in Miletus were on the contrary composed of 15 drums; those in Priene and Sardes were likewise constructed of separate drums. As on the Doric columns, the flutes were only cut after the columns were set, as proved by the shafts of the columns in Sardes

156 and on an incomplete column on the Temple of Apollo in Miletus. On the former, the guides and endings of the flutes are already wrought below the cymatium on the same block with the capital.

We find the same precautions on the bed surfaces of the drums, as were employed for Doric columns; only for very slender columns is iron frequently employed as a means of fastening them, as for example, on the remains of the western wall of the Erechtheion, overthrown by a hurricane some decades since, and which was decorated by three-quarter columns, and also to be still seen on the prostrate drums of the Temple of Cybele in Sardes. The iron pins were there immovably fixed in lead in the lower bed of the block to be set, then being lowered into the corresponding holes in the upper bed of the block previously set, and the melted lead was then introduced through a small channel in order to fix this part (Fig. 177).

Besides this method, Koldewey²²⁵ gives another mode of introducing the lead for fixing, by which the upper block was drilled through and the fluid lead was introduced through the hole. Similar pouring holes passing vertically and obliquely through the ashlar²²⁶ are also given by Bohn²²⁶ for the Temple of Athena in Pergamon. That in this case, if the necessary space were provided, the fluid lead would more certainly reach its intended place, than by the horizontal channel, is self-evident; but tamping the lead then became impossible, although it could be done on one side in case of a horizontal pouring channel; yet this tamping is of the greatest importance to the stability of the connection. Therefore the latter method is less secure and good, and on account of its complexity is indeed the earlier one.

Note 225. See his work, p. 57.

Note 226. See his work, p. 21, 22, and pl. VIII, 2.

186. Spacing the Columns.

The spacing of the columns no longer depends upon the frieze, as in the Doric order; they stand at uniform intervals and the intercolumniations, measured from centre to centre, do not at all exceed those of that architectural style. The lengths of the architrave have dimensions similar to those of the order previously described; they run from 5.18 ft. to 7.22, 11.91,

and even 17.32 ft., while we have found in Doric structures lengths of 8.53 ft., 12.46, 14.63, and even of 17.81 ft. (Fig. 178).

187. Antae Capitals.

As in the Doric order, the antae and pilasters corresponding to the columns have capitals of a form different from that of the columns. The volute motive of the latter is not transferred to them, since the face of the wall required no bolster, but cymatiums and astragals, richly ornamented by egg-and-dart mouldings, heart-leaves, beads and disks, form a beautifully developed termination of the vertical and undiminished antae, which rest below on a base, moulded like that of the columns.

The treatment of the cymatiums bands with leaf ornament at the angles is interesting, both on the antae and on the volute capitals.

The care employed in the execution of even the smallest detail is shown by this leaf ornament. Frequently concealed and used at a considerable height on the building, the details are yet worked out with the same love and care, as if they were placed directly before the eye of the observer; nowhere is to be found any carelessness in the modelling. How delicately felt and graduated in relief are the different parts of the leaves, how unusually beautiful are the delicately curved outlines of the oval and acute leaves; how well studied and beautifully arranged is likewise the foliage on the reentrant angle of the abacus of the corner volute capital (Figs. 173, 179, 180). And with all this minute execution and surpassing treatment of the smallest details, the view of the general effect of the whole was not obscured.

188. Piers.

5). Piers and Caryatids. -- Besides the columns, rectangular piers and piers with faces like half columns (Phigaleia) were likewise employed as free supports, as on the Propyleion of Priene (Fig. 181), where they supported the beams of the porticos. These stand on bases moulded like those of the columns, and like columns, they are diminished from base to capital, that exhibits unique treatment of the volutes, which reappear in allied form on the pilaster capitals of the Temple of

Apollo in Miletus.

A third kind of detached support is the human figures supporting an architrave. We have already become acquainted with them attached to the wall of the cella of the mightiest Doric monument, the Temple of Zeus in Akragas; as gigantic atlantes or telamones, they supported with arms thrown back the entablature of the middle aisle. Detached from the space-enclosing walls and bearing the architrave and cornice of a graceful portico, we again meet with them as isolated maidens in the Ionic style of architecture.

189. Caryatids.

These maidens (called caryatids) stand quietly and strongly on square plinths without especial animation in expression and attitude, the resting leg bent but slightly, the arms held close to the body, with carefully parted hair and hanging plaited tresses, a cushion upon the head, from which rises a cap imitated from the Doric capital.

Four such figures stand along the front of the Caryatid Portico at Athens in pairs similar in attitude and movement, symmetrically arranged about the axis of the building, the supporting leg on the outside with the folds of its coverings falling straight down, the leg at rest being on the side next the middle of the structure.

An Amazon from Thyrea once served a similar purpose, has her garments tucked up high, leans against a narrow pier and stands on a pedestal, with a Corinthian capital on her head, and is now in the Central Museum in Athens; in the same place are the remains of other free supports, that exhibit a strong, muscular and male upper part of the body, which ends below in smooth Hermes form. The monuments on which these finely wrought figures were employed are still unknown to me.

Note 227. See Sybel, von. Katalog der Sculpturen von Athen. No. 442.

The three well executed pier-statues with serpent bases from the So-called Stoa of the Giants in Athens must likewise have been utilized to support an architrave. In reference to the architrave supporting the colossal figures of the Temple of Zeus in Akragas, see Fig. 139.

Placed in front of the bearing support and only decoratively employed, like Egyptian prototypes, we find the human figure again on the so-called Incantada in Salonichi. The separation of the human form from its ornamental connection and its elevation to an active part of the construction, to be a free statical member, is here repeated with perhaps a more correct feeling. (Fig. 182).

If the figures are actually supports, then in accordance with the thinner and more elegant supports (they break easily at the weaker necking, as shown by the figures on the Erechtheion), the entablature is made lighter. Hence for example, the frieze is wanting on the building mentioned; instead of it, the upper band of the architrave is ornamented by rosettes in order to produce a richer effect or to compensate in some degree for the impoverishment of the entablature, due to the omission of the frieze. The internal supporting beams elsewhere corresponding to the frieze are omitted; the room is ceiled in the simplest manner by slabs with coffers. Dieulafoy recognizes in the arrangement of the entablature, the direct transference of the ancient Persian terraced roof cornice into stone.

190. Architrave or Epistyle.

6. The Architrave is made lighter than that of the Doric order, in accordance with the slender columns; instead of the taenia with the suspended regulae with drops, they receive a continuous crowning moulding, often richly ornamented; its vertical surface is divided into two or three fascias and is generally subdivided alike, both internally and externally. The separate fascias may have once possessed painted ornaments, but vestiges of these are no longer visible. On the smaller monuments, they are cut from a single block of stone in width; in temples of important dimensions, where the diameter of the columns is increased to 6.56 ft. or more, they are made of two stone beams in width, as in Magnesia, for example.

Remains in Priene show the inner vertical surface of the architrave less in depth than the outer one, and the under surface is decorated by a sunken panel, bordered by a pearl band and heart leaves. (Fig. 183).

The height of the architrave is usually equal to the upper diameter of the column; it is frequently higher on the earlier

temples and also somewhat lower in the later ones. Thus for example, the architrave is higher on the little Temple of Nike Apteros, is equal on the Erechtheion, and is lower on the Temples in Priene and in Miletus, than the upper diameter of the column.

261 As shown for Doric monuments, the contact of the bearing surfaces is only on narrow cut borders. The architrave, cut from a single block, joins at considerably less than 45° for a space on the inside, then continues at right angles to the exterior.

In this order, it has also the purpose of receiving the beams of the portico, which rest directly upon it; this succession and jointing carries with it an alliance with wooden construction.

191. Ceiling Beams and Ceiling.

7). The Ceiling Beams are sometimes placed with regard to the location of the columns, without the addition of side beams, so that the centres of beams and columns coincide, and another rests on the middle of the architrave block, extending from one column to another, as on the north portico of the Erechtheion, or they are placed entirely independent of the colonnade with added side beams, as for Doric marble beam ceilings, and which is also the case for the little Temple of Nike Apteros in Athens. (Fig. 184).

The ceiling beams are of rectangular section, are dressed smooth on the bottom and sides, and on rich monuments, they are crowned at top by a cymatium, pearl bead, with a narrow band beneath these, or merely by an echinus moulding in simpler monuments.

They are used for a span of 21.32 ft. on the Erechtheion and receive the ceiling slabs, which there consist of large pieces with rich coffers, and which are cut away on the upper surface in accordance with form of the coffers in order to lessen the weight of the slabs.

The coffers were triply recessed and on their panels were fixed metallic ornaments, gilded bronze rosettes, as proved by the peculiar arrangements and by through holes. (Fig. 185).

Eggs-and-darts were richly painted and gilded on the echinus mouldings; the bands between the coffers were ornamented by

carved pearl beads, between which were painted red frets on a bluish ground.) See Colored Plate opposite page 252).

On the little Temple of Nike, the spaces between the beams were fitted with thin perforated slabs with covering slabs, as on the Doric Temple of Theseus. But the coffer slabs do not lie on the echinus mouldings, but on a specially devised bearing on the body of the beam; the carved mouldings were $1/16$ in. below this, so that the delicate projections should be untouched during the setting and should also receive no pressure afterwards.

Between the beams were inserted half beams of the same section, resting on the architrave, whose projections were mitered, then fitted together at right angles, thus completing the frames of the ceiling panels. (This construction is still preserved on the Temple of Nike and on the north portico of the Erechtheion). The beams extend about half-way across the architrave, but do not show on the facade; the ends of the beams and the blocks between them are covered by smooth slabs like a frieze, which are either left plain externally or receive figure decoration, and appear as a separate architectural member above the architrave, the frieze upon which rest the protecting covering slabs of the main cornice. (Fig. 185).

If the frieze is omitted on the exterior, and only the architrave and cornice compose the entablature above the free columns, the ceiling beams supporting the slabs likewise disappear in the interior and give place to a simple ceiling of coffered slabs, as shown, like ^{one} the still preserved on the Caryatid Portico.

192. Frieze.

8). The Frieze (Zoophoros, figure-bearer, thrinkos) is required by Vitruvius to be about one-fourth smaller than the architrave; "but if reliefs are to be executed thereon, about one-fourth higher, so that the sculptures may appear better". Vitruvius' rule approximately agrees with the plain friezes of the buildings in Priene; the friezes are there one-fourth and two-fifths less than the architrave. But the sculptured friezes of the Temple of Nike and of the Erechtheion are likewise lower than the respective architraves by about one-twelfth; the rule does not appear to agree with these.



The small figures of the frieze are either carved on the slab, thus being of the same piece with it, or they are wrought separately and attached, as on the Erechtheion, while the frieze slabs are of darker Eleusinian marble and the figures are made of Parian marble and were fixed by iron pins.

The addition of color also increased the effect here. With this development, there is naturally nothing said of any influence of the frieze upon the arrangement of the columns.

193. Main Cornice.

9). The main cornice on most Attic monuments consists of a bold and moderately projecting inclined slab crowned by an echinus moulding and deeply undercut beneath, concealing an ogee with pearl bead, which passes into the surface of the frieze (Fig. 186).

The front surface of the cornice is usually inclined somewhat outwards, so that the lowest point lies nearer the plane of the frieze than the upper one, an arrangement likewise found in the covering bands of the small Doric members, as for example, on the abacus of the column and antae capitals and on the front surface of the cornice slab.

194. Optical Rules.

Vitruvius requires for Ionic columnar structures:-- "all members above capitals of columns, especially the architrave, frieze, cornice, tympanum, pediments and acroterias, must have their faces inclined outwards about one-twelfth their height, because if we stand before them and two lines are drawn from the eye, one touching the lowest and the other the highest part of the building, the latter one to the upper part would be longest. Thus the more the line of sight to the upper part is elongated, the more this gives to it an appearance as if inclined backwards. But if the members of the facade are inclined forward in the manner just prescribed, they will they appear vertical when viewed, and according to the measure of the angle".

264. (III, 5, 13). The fascias of the architrave are also actually inclined forward, as well as the front surfaces of the cornice slab; I cannot answer for the forward inclination of the other structural parts mentioned by Vitruvius, which are unfortunately no longer in position on any Ionic monument, or even no longer exist.



What an appearance, for example, would the pediment in Miletus have made, if with a height of about 19.68 ft., it had overhung about 1.64 ft? The refined feeling and eyes of the Greeks must have once required in Doric buildings a pyramidal diminution of all parts of a temple for well understood optical reasons, while for the frequently contemporary Ionic buildings, often standing in the immediate vicinity of Doric monuments, the opposite was prescribed.

Of what use is all the good researches on optical deceptions and the rules deduced therefrom, in the presence of such opposed facts! In the Ionic style everything is practically rejected, which in the Doric is prescribed as the highest perfection, as the most refined observance of all means for deceiving the eye! We here have the consistently carried out backward inclination of the columns, walls, architrave, frieze, and the pediment, there the exactly vertical position of columns and walls, the forward inclination of the front surfaces of the architrave and cornice.

Vitruvius requires a forward inclination, so that the parts of the building may appear vertical to the observer; we generally prescribe a backward inclination, in order that the vertical may not seem to overhang! The measurements are moreover small in this case, as for example:--

Overhang of the fascias on architrave of Erectheion	1/27 in.
Overhang of face of cornice there,	1 5/16 in.

For Doric members.

Overhang of abacus of ante on Parthenon.	1 7/8 in.
Overhang of cornice above cella wall and frieze,	2 5/8 in.
Overhang of face of main cornice of Propyleion,	3 ins.
Overhang of face of cornice on Pinacothek,	2 1/4 in.
Overhang of abacus of capital on same,	1 1/2 in.

The overhang of these members may frequently be ascribed to the fact, they received ornamentation, and that this was better presented to the eye in this way. But this application of ornament is not always the case; others are so high from the ground, or one is compelled to view them from so near a point of view, (as for example, the cornice placed over the frieze of the Parthenon), that such a slight forward inclination of those parts

must remain without special effect.

195. Dentils.

But the simple undercut cornice gives place to a richer treatment of the main cornice, especially in monuments in Asia Minor, where the so-called dentils are inserted between it and the frieze. We find them employed on Attic buildings, only on the Caryatid Porch in Athens.

They vividly recall a motive borrowed from wooden construction, the projecting small ceiling beams, that were first cut in stone on the rock-cut tombs in Lycia.

On a monument in Priene, they project from a vertical surface and thus appear as if suspended, while on other monuments, like the Caryatid Portico, they more properly and elegantly seem to rest on the lower projecting member and then express the function of support. We likewise find the dentils at the angle of the building arranged in accordance with this idea (Fig. 187). We indeed find on some buildings the angles left solid, which may result from the not quite perfect completion of this portion of the cornice. The projecting angle appears to have been cut only after the setting of the cornice.

The dentils are usually crowned by a kind of head band, recalling a piece laid on the ceiling beams, upon which directly rests the undercut cornice slab.

196. Pediment and Pediment Cornice.

10). Pediment and Pediment Cornice. Low pediments crowned the ends of the temple, and like those of the Doric order, these must have been intended to receive groups of figures.

The monuments no longer yield any data concerning this, yet we know from Pausanias, that the externally Ionic Temple of Athena Alea in Tegea, built by Scopas, possessed sculptures in the tympanums representing the Calydonian Hunt in one and the Combat of Telephos and Achilles in the other.

Note 228. Adler believes that the external architecture was treated in the Doric style and that only the cella had the "Ionic arrangement". See Gent.d.Bauw. 1882. p.98.

The pediment was covered by a main cornice like that of the horizontal entablature, if the latter were without dentils. But if these existed, they were omitted on the pediment cornice,

like the mutules on the Doric order.

197. Cyma, Acroterias, and Roof.

Both the horizontal and the pediment cornices are crowned by an ogee moulding, the cyma, which was decorated by vertical anthemion ornaments and by lions' heads along the sides. (Fig. 188).

The cyma on the Caryatid Portico consists of a continuous quarter-round ornamented by egg-shaped leaves, as on the Propyleion, and terminated above by a small ogee moulding with leaves.

The angles and apex of the pediment were also crowned by ornamental acroterias or small figures, as on Doric temples. (See the Nereid Monument at Xanthus and the angles of the Temple at ^{Ionic} Pergamon.).

The construction and covering of a roof was indeed the same as that previously described, and we show in Fig. 189 the arrangement according to Choisy, as deduced from the building accounts. ²²⁹

Note 229. See *Études Epigraphiques sur l'Architecture Grecque. 3 me Etude; D'Erechtheion d'après les pièces originales de la comptabilités des travaux.* Paris. 1884. Also, Michaelis, A. *Mith. d. Kais. Deutsch. Inst. Athen Abth. Athens.* 1889. p. 349 - 366. Lastly, Kirchhoff. *Corp. Inscript. A. H. IV. 3.* (1891). p. 148-152. ²³⁰

c. Monuments.

198. Monuments.

1. Rock-cut Tombs in Lycia. Examples at Telmissos, in Antiphellos and in Myra. (See Fig. 154).

2. The Nereid Tomb at Xanthus in Lycia. A tetrastyle peripteral structure on a high stylobate, columns short and widely spaced with heavy Ionic bases and clumsy capitals, strongly diminished shafts with entasis, the entablature without frieze, instead of which is an architrave decorated by figures, as in Assos.

Note 230. The later works in Asia Minor, that afford no data for determining the date of erection, but which were still mostly the work of Greek architects, even if the country had changed its masters in course of time, are here enumerated together with those monuments dating from the period of Grecian independence, or those belonging to the era of the Diadochides.

One does not hesitate to include the Olympieion in Athens with

the monuments of Grecian art, since it stands on Attic soil, although it was completed by a Roman architect.

268. 3. The Heroon (of Empedocles) in Selinus, a tetrastyle prostyle building. According to Hittorf, Ionic columns with Doric entablature and triglyph frieze (?). Material a yellowish limestone.

4. The monument of Theron at Akragas. A Doric entablature supported by four Ionic three-quarter columns (angle columns) on a high stylobate. The columns are strongly diminished, have Attic bases and capitals without bolsters, which are alike on all sides and have volutes curved outwards. Material a yellowish limestone.

5. The Heraion at Samos (already enumerated among Doric monuments, since it is assumed to have been built in a mixed style) was according to some a decastyle dipteral building, according to others, a pseudodipteral structure with wooden beam ceiling in panels. Several marble bases of columns are still preserved in their old places; others lie scattered around. The bases are archaic and heavy, with a fluted bolster below; the diameter of the column is 7.41 ft.; the capital shows a Doric echinus with a carved egg-and-dart moulding; but it should not be termed Doric for this reason; it may just as well be the lower half of an Ionic capital made in two pieces. (See Art. 123 and the section of the Eretheion capital in Fig. 173). The shaft without flutes still stands and serves as proof, that the Temple was never entirely completed. Moreover, it is the most ancient Ionic monument in stone.

6. The Temple of Nike Apteros on the Acropolis of Athens, (a tetrastyle amphiprostyle structure on a white marble substructure of three steps. (Fig. 190).

The cella is built in small dimensions (12.40' x 13.74 ft) and is open on the eastern end; two narrow piers form the sides of the doorway; the side openings were closed by grilles, whose marks still remain. Similar grilles were on both sides of the eastern prostasis between the angle column and the antae. The internal walls appear to have had paintings; the painted ornaments of the architrave, antae capitals, cornice, and coffers, may still be recognized by their outlines, while the colors



can no longer be distinguished.

The columns are strongly diminished and have 24 flutes; the base is without plinth and the capital without necking. The entablature goes $3 \frac{1}{2}$ times into the height of the column; the height of the architrave is less than the lower diameter of the column. The intercolumniation is 5.18 ft. The frieze is decorated by figures; the ceiling beams rest directly on the columns.

Spon and Wheeler saw the little Temple while in its original form; it was torn down by the Turks soon after the visit of these travelers. Its restoration was commenced in December, 1835 under the direction of Hansen, Ross, and Schaubert, and was completed in the following year. (Fig. 190). According to Wolters, Oimon was the builder of the "Nikepyrgos" (substructure), while the temple on the latter is later.

Note 231. In Bonner's Studien. Aufsätze aus der Alterthums-wissenschaft, dedicated to R. Kekule by his pupils. Berlin. 1890.

7. The Temple on the Ilissos near Athens was about equal to the latter in size; it was likewise a tetrastyle amphiprostyle building, only somewhat longer in proportion to its width.

The columns were a little stumpy, the bases archaic, the capitals of beautiful design, the bolster joining the volutes was gently curved downwards. The architrave was not subdivided into three parts; frieze and cornice were without ornament, and the entire entablature was somewhat heavy in proportion to the columns.

The little Temple was built of white marble, and it was very well preserved until Stuart's time, but was afterwards torn down; not a vestige of it can now be seen.

8. The Eretheion in Athens, the most beautiful and comparatively the best preserved monument of the Ionic style on the Acropolis of Athens, has on the east a hexastyle portico, on the west being 4 engaged half columns between angle pilasters with 3 windows in the middle intervals between the columns. This arrangement of half columns rests on a high substructure, so that the bases of the half columns are higher than those of the eastern portico. The design resulted from the peculiarities of the site. Not far from the western wall, there is on the northern side the magnificent doorway, and before this is a large

large porch with 4 columns in front and 2 on each side. These columns are taller than those of the eastern side. The southern side is on the same level with the eastern portico and has a separate projection, consisting of a high substructure on which 6 caryatids (4 in front) support an elegant entablature and a ceiling with coffers. The interior has not yet been sufficiently explained in all its parts, to which difficulty the obscurities in the description by Pausanias and the various additions of a later time have contributed not a little. Restorations of the building were published by Tetze, Hansen, Bötticher, and Niemann. Julius also undertook one.

Note 252. *Baumelster*. Vol. 1. p. 484 - 491.

Pausanias calls this white marble monument the Erectheion, stating it to have been a double temple, in whose inner part was a spring of salt water, agitated during the blowing of the south wind, on whose rock floor might be seen the marks of a trident, signs made by Neptune to show that the country belonged to him. Here was also worshipped the most sacred image of Athena, that fell from heaven; here stood the golden lamp of Callimachos, which burned continuously for a year with a single filling of oil and a wick of "Carpasian" flax; the smoke escaped through a bronze palm trunk reaching to the ceiling. In the cella of Athena Polias was the consecrated gift of Cecrops, the wooden Hermes, scarcely visible for myrtle branches; articles from the booty of the Medes were also laid up there; the sacred olive tree, the evidence of the goddess for the country, put forth its branches in the Pandroseion. The Cecropion adjoined the western portion of the Temple, and the graceful Caryatid Portico had its front towards the south.

Under the olive tree stood the Altar of Zeus Herkios. In the interior were various altars, where sacrifices were offered to Erectheios, to the hero Bootes, and to Hephaistos. The walls were decorated by paintings relating to the family of Butades. The colored ornamentation of the different architectural members has already been mentioned. The building shows two different times of erection, as discovered by Chandler and proved by an inscription tablet brought to England, on which are inscribed collections for the still unfinished portions of the Temple.

The recently discovered inscriptions are interesting, which were discovered by Ross in 1835 - 6 beneath the ruins of the great battery in separate pièces, since they contain accounts for the completion of the building and afford, in regard to the painting in particular, wages for sawyers, burners-in (encaustic painting), gilders, day laborers, sculptors, modellers, who furnished wax models, bronze-workers, who executed the coffer ornaments, superintendents, etc., are entered thereon; payments for the purchase of gold and of lead are recorded on them. ²³³

Note 233. Details of these in Quast, J. von. Das Erechtheion zu Athen. From the work of H. W. Inwood. Berlin. 1861-4. p. 267; see Note 229; also, Pausanias, I, 26; lastly, Borrmann in Mitt. d. Kais. Deutsch. Arch. Inst. Athen Abth. Athens. 1881. p. 372 etc.

The Temple is entirely built of white pentelican marble, excepting the relief frieze of darker Eleusinian stone, as well as the sculpture of this frieze and the roof tiles, which were made of Parian marble. The foundations are built of poros stone; the roofs were made of wood, as proved by gains cut in some roof slabs. Tetaz assumes that the roof slabs did not here rest directly on the rafters, but on a strong sheathing of boards. The gutters had a painted ornament, whose preliminary outlining with the point is still recognizable. The proportions, mouldings, and treatment of details belong with the noblest, most beautiful, and richest in antique art. ²³⁴ See the colored Plate opposite page 252, as well as Figs. 180, 182, 185, 186, and 189. ²³⁵

Note 234. The Caryatid Portico was in a ruined condition in consequence of Lord Elgin's robbery and of the explosion of a bomb, and it was restored in 1846 at the cost of Piscatory, then French ambassador in Athens, by the architect Faccard.

Note 235. Concerning the plan of the building, also see: -- Rangabe. Das Erechtheion. Mitt. d. Kais. Deutsch. Arch. Inst. Ath. Abth. 1882. p. 258, 321, Pl. 10; also Petersen, E. Zum Erechtheion. Same. 1885. pp. 1-10. In reference to the doorway of the north portico, see: -- Weier-Schultz in Hellenic Studies, Vol. 12, (1891), pp. 1-13, pls. 1-3.

9. The Ionic Hall of the Propyleion in Athens, consisting of 6 marble columns supporting the entablature, 3 in each row, connected by architraves bearing the ceiling beams and slabs.

The columns are slender, have a slight entasis, and including capital and base, are somewhat more than 9 lower diameters in height. The surface of the shaft shows 24 flutes, which end at top and bottom in semicircular form. The base is Attic and stands on a kind of circular plinth, wrought on the supporting ashlar; the upper torus is fluted horizontally. The nobly shaped capital has single volutes and borders of the same, also without a necking.

The height of the architrave equals the upper diameter of the column; it is divided in 3 fascias and is crowned by an echinus moulding.

The shafts are built of monolithic marble drums; only a few short fragments are now standing; the capitals partly lie in pieces on the ground. (See fig. 148, p.224; Fig. 168, p.247).

271 10. The interior of the Temple of Apollo in Phigaleia. Four piers at right angles thereto and one at 45° break each side of the internal wall of the cella. The piers end in half columns in front with the same thickness as the pier. They are slender, moderately diminished, built of single blocks, and have a height of about 10 lower diameters; 11 flutes end above and below in horizontal form, surround the rounded portion, and lead in a bold apophyge to the enlarged and projecting dish-like base. The capital has no bolster, but is on three sides furnished with volutes curved outwards, on which a bold, slightly curved abacus rests in a peculiar manner. The architrave is smooth and has merely a crowning moulding with a narrow band beneath it. The animated and beautiful frieze with figures is about one-third higher than the architrave; a cornice above it is delicate and projects the same as its height. (See Fig. 191 and p. 225 under 7).

272 11. The Philippeion in Olympia was a circular building surrounded by columns, according to Pausanias, whose apex was formed by a bronze poppy-head, that held the beams together.

The German expedition describes the circular portico as belonging to the Ionic order. ²³⁶

Note 236. See *Ausgrabungen*; Vol. 3, pl. 35; *Funde*, p.34, pl. 37; *Footnote*, p.17; lastly, p.70, 193, 196, of the same volume.

The restoration shows the Temple, or rather the Heroon, as a

circular peripteral building of 18 columns and with a diameter of 50.02 ft. Three marble steps formed the visible substructure, while the enclosing walls consisted of poros stone. The bases of the columns exhibit a simplified Attic-Ionic design in the mouldings; the echinus and the angle-flowers below the single channelled volutes of the capital are left smooth. The architrave is wrought from the same block with the frieze, and the cornice has dentils. The cyma was of marble, decorated by lions' heads and crowned by palm-shaped antefixas. The roof was covered by clay tiles, the portico was ceiled with stone slabs with trapezoidal coffers. The internal wall was divided by 12 Corinthian half columns. The ornamental forms were nearly all produced by painting, as well as the decorative details of the coffers. The colors themselves could no longer be determined.

12. The Temple of Athena Alea in Tegea excelled in beauty and extent all temples in the Peloponessus, according to Pausanias. The order of columns in the interior was Ionic, while Doric columns must have surrounded the building. (See Art. 158, p. 231). The front tympanum was adorned by the previously mentioned Calydonian Hunt, and the rear one by the Combat of Telephos with Achilles. Besides the statue of Athena, the interior contained statues of Asklepios and of Hygeia by the builder of the Temple, Scopas from Paros. The teeth and skin of the Calydonian Boar were preserved here. Besides these scanty notices, only a few fragments exist for the determination of this famous building.

13. The Mausoleum in Halicarnassus, the Tomb of King Mausolus, who died in 354 B.C., has been tolerably well settled by Newton's excavations, in relation to its extent and its details. It was perhaps a work of the architect Pythios, the architect of the Temple of Athena in Priene.

On a high substructure stood a cella surrounded on four sides by Ionic columns. There were 9 columns on the facade and 11 on the side, and they are moderately slender, slightly diminished, and surrounded by 24 flutes. The base had a bold torus above two scotias connected by astragals. The volutes of the capitals are small, and there is no necking. The architrave is divided into three bands, the frieze is ornamented by figure reliefs, and

the cornice is enriched by dentils; the cyma was decorated by anthemion ornament and lions' heads. Above the cornice rose a marble pyramid of 24 steps, on whose platform stood the colossal statue of the king with the quadriga. Vestiges of color were likewise here discovered on some remains.

273 14. The Temple of Apollo Didymaeos in Miletus, made famous by its very ancient oracle, was burned by Darius, then perhaps restored, entirely destroyed by Xerxes, and again rebuilt after the war for freedom. The remains now preserved to us indicate the era of Alexander. The last Temple was built at the same time as the Temples of Ephesus and of Magnesia by the architects Daphnis of Miletus and Paeonios of Ephesus (the latter being the builder of the Artemesion in his native city); Vitruvius reckons this, with the Artemesion in Ephesus, the Temple of Demeter in Eleusis, and the Temple of Zeus in Olympia, as the four finest in antiquity. Strabo states concerning it, that it excelled all others in magnitude, and that on account of its great span, it remained without a roof. Pausanias simply mentions it as not completed. (Fig. 192).

It was still standing in the 5th century A.D. and was probably destroyed by an earthquake.

The cella walls still exist in their entire extent to a height of about 9.84 ft.; the ashlers in part have setting bosses, were cut from great blocks of grayish marble, and merely form the facing of the walls 8.95 ft. in thickness, whose middle portion is built of rough stone. The walls were internally divided by pilaster projections, whose varied and original capitals belong to the most interesting finds. A frieze was arranged between these capitals, which was ornamented by griffins holding lyres. (Fig. 193).

The Temple was a dipteral structure with 10' x 21 columns and measured on the facade 159.26 ft. between centres of columns; (at angles ?); the intercolumniation was 17.32 ft. and the lower diameter of the shaft was 6.89 ft.

Three columns are still standing, two being connected by the architrave; one is not finished and is only roughly cut, verifying the statements of the ancient writers, but all capitals and the cornice have otherwise disappeared. To the bases pub-

published by Texier and others are to be added others with polygonal plinths and decorated (See Fig. 168, p.243), excavated later, as especially peculiar. The shaft is surrounded by 24 semicircular flutes extending beneath the cymatium: a necking is wanting. The volutes are beautifully curved and have the proper relative dimensions, but are connected together without an elastically curved bolster. The architrave is divided into but two bands and is decorated by an ornamented cove, ogee, and pearl bead at top. Exclusive of capital and base, the columns are each composed of 15 drums. The published restorations are problematical.

15. The Artemesion at Ephesus was the sole sanctuary of Ionia spared by Xerxes. After it was burned by Herostratos, it was rebuilt by the zealous participation of all the Greeks and according to the designs of the architect Deinocrates. Built in a marshy location, Samian mechanics effected the draining of the site "by means of skins of animals and charcoal" and made possible the erection of the structure on the prescribed place. The beneficent and pious feeling of the believers furnished certain parts, for example columns, in whose flutes were inscribed the name of the giver. The Temple, for which the neighboring marble quarry of Coressos supplied the materials, rose as a dipteral structure from a substructure of 10 steps in front. The columns were about 58 ft. high, and 38 of them had on the lower part of the shaft the sculptured figure ornament previously described, in the production of which Scopas was engaged, while Praxiteles adorned the great altar before the Temple with sculptures. The capitals exhibit a treatment allied to that of the Athenian Propyleion.

The Temple was plundered and destroyed in 262 A.D.; with the ruins, the Turks built in the 13th century the Mosque of Selim, which is now likewise a ruin! ²³⁷

Note 237. According to Curtius, E. Ephesos. Berlin. 1874. pp. 34, 35.

237 In the spring of 1871, Wood succeeded in bringing to light some marble remains, sunk in mud 19.68 ft. deep. These prove the correctness of the fabulous dimensions of the parts of the Temple given by Texier and others, as for example, columns of

10.50 ft. diameter, or an intercolumniation of 29.52 ft.! Vitruvius also locates the invention of the Ionic style of architecture at Ephesus in the 7th century B.C.! (Figs. 194, 195)²⁸⁸

Note 288. In reference to the older Artemision, see p. 225 and Fig. 176, p. 254.

16. The Temple of Artemis Leucophryne at Magnesia on the Meander was built of white marble by the architect Hermogenes. A pseudodipteral structure on a substructure of 5 steps, it exceeded in magnitude all temples in Asia, according to Strabo (XIV, 40, p. 647), excepting those in Ephesus and Didyma; it even excelled those in beauty of proportions. It was completed and was nearly contemporary with the Temple at Priene, therefore being erected about 330 to 300 B.C. As on the Parthenon, the ashlar of the cella were connected by iron cramps, the bases of the columns were of Attic form, the torus ornamented by leaves; the shafts were fluted and were composed of 3 to 4 blocks; the architrave and frieze were constructed of two pieces in width. The cyma was decorated by lions' heads placed over and between the columns, and anthemion ornaments were sculptured between them. The portico was connected with the cella by wooden architraves (ceiling beams?). No figure ornamentation was arranged in the tympanum. The terra cotta remains found near the Temple are of interest, are covered by a vermilion-red glaze, and are surrounded by a band with running ornament in black.

The Temple was surrounded by a wall built of great ashlar with bosses, which adjoined the walls of the city. Rectangular defensive towers were placed at certain distances; Doric colonnades of great simplicity extended along the inside of the walls, whose surfaces were ornamented by monochrome painting.

Especially notable is the magnificent frieze representing the Combat of the Amazons, of which about 656 ft. in length altogether were found, as well as other portions recently by Villefosse, Humann, and Kern. About one-third of this is in the Museum of the Louvre.²⁸⁹ Further extensive excavations have recently been made at this Temple at the cost of the Archaeological Institute in Athens and of the Museum in Berlin, which show that the plan of the entire building is still tolerably well

preserved. Almost all pieces of the columns and of the entablature lie around the temple, so that the entire superstructure may be restored in drawings. Its importance for the history of art consists in the fact, that it was the first pseudodipteral building, as stated by Vitruvius. (III, 2, 8). The excavations have verified Vitruvius' description. Three building epochs may easily be distinguished in this building: a), the ancient dipteral structure with Ionic columns of poros stone, that have 32 flutes (5th century ?); b), the pseudodipteral building of white marble erected by Hermogenes, likewise in the Ionic style (3^d century ?); c), a Roman rebuilding, when the cella wall was furnished with a sculptured frieze with scrolls, and the temple court was enclosed by porticos and an encircling wall. ²⁴⁰

Note 239. Photographic representations of this are in:--
Revue Archaeol. 1887. p.257. Also, see Rayet and Thomas, *Milet et le Golfe Latmique. Excavations and Explorations made at the cost of Barons S. and E. de Rothschild and published under the auspices of the Ministry of Public Instruction and Fine Arts. Paris. 1887.*

Note 240. See Mitt. d. Kais. Deutsch. Arch. Inst. Athen. Abt. Vol. 16, part 2. Athens. 1891. p.264, 265.

17. The Temple of Dionysos at Teos, an Ionic hexastyle building, also eustyle, probably after its destruction by Xerxes rebuilt by Hermogenes from Alabanda in Caria, who concurred with Archesios and Pythios in declaring the Doric order to be unsatisfactory for the Temple, according to Vitruvius.

The considerable ruins consist of a confused heap of overthrown blocks of marble, utilized by the Turks for tombstones and for burning into lime.

Of the base, the plinth, lower torus, the scotia and its fillets, were wrought in one piece, while the upper torus with the fillet and anaptyge were cut on the shaft of the column. The fragment of a lion's head and a portion of an ornament are the sole remains of the main cornice yet found. ²⁴¹

Note 241. New drawings of this temple are to be found in Antiquities of Ionia, vol. 4 (1882). Also see Rayet and Thomas.

18. The Temple of Athena Polias at Priene was a peripteral structure of 6'x 11 columns, built 340 B.C. by Pythios. The ba-



The bases are composed of two marble blocks and rest on plinths; the fluted shafts of the columns consist of several drums; the capital is without a necking and has beautifully treated volutes, connected by a gently depressed bolster; the eyes of the volutes are drilled $1\frac{1}{4}$ inches deep, and they were therefore intended to receive metallic ornaments, like the capitals at Ephesus.

The architrave was divided into three bands and crowned at top by a cove, cymatium and a pearl bead; the frieze is about $\frac{2}{3}$ lower and remains smooth; the main cornice has dentils and cymas ornamented by lions' heads and scroll ornaments.

The upper half of the torus on the bases is left smooth (unfinished), while the lower half is fluted; the dentils at an angle likewise remain unfinished. (See Fig. 163, p.243; Fig. 187, p.264). The ruins of this Temple lie in a confused heap with those of the appertaining:--

19. Propyleions, which originated at a later date than the Temple. Their interiors are divided in three aisles by two rows of pilasters, whose capitals recall those of the pilasters at Miletus (Fig. 196). The pilasters have the same bases on plinths as the columns: the shafts of the former are diminished from base to capital. The enclosing walls are divided internally and externally by pilasters. Tetrastyle porticos adorn each end of the buildings. the bases of their columns standing on square plinths.

The shaft is moderately diminished, consists of a single drum, surrounded by 24 flutes and about $9\frac{1}{3}$ times as high as the lower diameter. The volutes are not very large and are connected by a straight band; the bolster is covered by free scroll ornaments. (See Fig. 171).

The architrave is externally divided into three bands, but internally into but two and is lower there, and has a sunken panel on its under side; the frieze is unusually low, the main cornice has dentils.

20. The Temple of Cybele in Sardes, so-called by Prokesch and Braun, referring to Herodotus (V, 102). Destroyed by fire and earthquake, 6 marble columns were still standing in 1750, 26, 3 at the beginning of the next century, and but 2 at this time, half covered by earth. Whatever cut stones belonging to the

walls, entablature, and columns, lie on the ground or are still concealed by it, are carried away for building purposes, according to the needs of the inhabitants and of Europeans, who build railways.

The Temple likewise belonged with the largest of antiquity, since the shafts of its columns show diameters averaging 6.56 ft.; these indeed had a height of 58.04 ft., and thus were approximately equal to those of the Artemesion in Ephesus. They were built of roughly cut drums of unequal sizes, with a hole at the centre, carefully polished toward the exterior, and connected together by iron dowells set crosswise. The flutes are started on the capital blocks; a rose springs from a light scroll ornament between the volutes; scales and upright palm-leaves cover the bolster. The eyes of the volutes have holes for the reception of metallic ornaments. (See Fig. 175).

21. The Temple of Aphrodite in Aphrodisias was a pseudodipteral building of 8×15 columns on a substructure of three steps, and was pseudotripter at one end. Its dimensions on the lowest step of the stylobate are 72.16×160.72 ft.

The columns stood on plinths; the architrave was divided in three bands; the frieze was smooth, and the cornice had dentils. The style of the monument is of such purity, that it can be placed on a level with the most beautiful in antiquity. Some of the columns were given by the citizens, who inserted their names and the motive of the gift on a tablet fixed on the column. The rectangular temple precinct was enclosed by a wall, which was subdivided by coupled Corinthian columns, alternately supporting segmental and angular pediments, interrupted by niches.

22. The Temple of Zeus in Aizani (Aizanoi) in Phrygia, scarcely mentioned by ancient writers, was entirely unknown until 1825. An English traveler brought the first news of the existence of these magnificent marble ruins, which certainly date from the end of the Asiatic monarchy or the beginning of Roman supremacy. Inscriptions from the 2d century B.C. were found there and permit the inference of a later date; but there is too much that is beautiful in the architecture, for this to be accepted with certainty. The Temple was a peripteral structure of 8×15 columns on a substructure with 7 steps in front; the

intercolumniation was 8.30 ft., and the distance of the columns from the wall of the cella was 15.28 ft.; the dimensions on the stylobate were 121.03 × 71.83 ft. The monolittic marble columns had diameters of 3.18 and 2.86 ft. for a height of 27.97 ft.; the height of the capital was 1.21 ft. and that of the base (including plinth) was 2.10 ft.

The volutes are rather small and are connected by a straight band. In a peculiar way, small vases occupy the upper endings of the flutes. The capitals of the columns between the antae have cup-like members decorated by acanthuses beneath the volutes; the antae capitals have similar ornamentation. The walls of the cella are decorated below by frieze bands, and are crowned at top by a rich foliage frieze. The architrave is divided into three bands, which are connected by pearl beads, and it is decorated at top by a richly carved egg-and-dart moulding and palm-leaves; the architrave is on the inside lower, simpler, and divided into but two bands. The frieze has vertical piped ornament; the cornice has dentils with small modillions over them. Beneath the cella is a semicircularly vaulted room 52.48 × 29.52 ft., accessible by a stairway, that may have served for preservation of the treasures of the Temple.

The Temple terrace is also of importance, is for the most part preserved, and it measured 480.19 × 534.31 ft. It was broken at one side by a flight of projecting steps 98.4 ft. wide, on the right and left of this being decorated by 22 arcades, whose former facing with marble slabs is now settled. Gardens, exedras, statues and stoas, were planned and built in the Temple precinct, which was enclosed by a wall.

23. An allied treatment of details, especially on the capitals, which accord tolerably with those between antae in Aizanoi, is shown by the colonnade on the scene of the Theatre in Laodiceia.

24. Finally, the little portico of a Bath in Onidos is to be mentioned, with its pretty columns-in-antis, as well as the following remains of monuments.

25. Two Ionic votive Columns near Mylasa.

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26. Ruins of a Temple of Notion near Oclophon.

Note 242. See Schuchardt; Mitt. d. Kais. Deutsch. Arch. Inst. Athen. Abth. Vol. II. Athens. 1886. pp. 421, 422.

27. Ruins of the principal Temple of Pessinus in Galatia.

28. Temple of the Napean (?) Apollo on Lobos, whose remains were removed and built into later structures. The very archaic volute capitals are of the highest interest for the history of art (see Art. 176; Fig. 166, p. 245), five of which were built into the old Church of Taxiarchis. The spiral lines are likewise here drawn with a free hand and their radius of curvature does not diminish uniformly. The capitals exhibit a great similarity to the capital from Neandria published by Clarke.²⁴³ (See Art. 176).

Note 243. In Amer. Jour. of Archaeol. 1885.

The shafts of trachyte that have been found, 23 in number, have diameters of 1.64 to 2.33 ft. The bases belonging to them consist of a great torus of segmental form and a smaller astragal above it with the apophyge of the shaft.²⁴⁴

Note 244. See Holdewey. Die Antiken Baureste der Insel Lesbos. Berlin. 1890. p. 44-46; pls. 16, 17.

29. The Temple in Messa on Lesbos. Only the foundations now remain on the old site and these consist of four enclosing walls and two longitudinal and transverse walls extending between them. The material is black trachyte-tufa. According to further discoveries, it may be assumed that the Temple was a pseudo-dipteral structure of 8 x 14 columns, that stood on a substructure of 3 steps and consisted of cella, pronaos, and opisthodom.

The palm leaves of the angles of the volutes lie on the cyma; the volute eyes have a square inset in the circle. The fascias of the architrave are separated by pearl beads; the under surface is sunken, this panel being enclosed by a pearl bead. The cornice is of beautiful proportions and exhibits dentils, the cyma on the geison is ornamented by scroll ornaments and lion's heads, the latter being perforated.²⁴⁵

Note 245. See same work, p. 47-61; pls. 18-26.

30. The Temple of Roma and Augustus on the Acropolis of Athens. An Ionic monopteral structure of white marble stood on a stylobate of two steps, measuring 20.34 ft. from centre to centre of columns. The capitals of the columns are imitated from those of the Eretheion; the high architrave is divided in three bands, the frieze is plain, and the cornice is without

dentils.²⁴⁶

Note 246. See *Antike Denkmäler*, published by Kais. Deutsch. arch. Inst. Vol. 1. Berlin. 1891. p.25.

31. The Propyleion of Ptolemaios Ist on Samothrace. A double portico structure with 6 columns on each front, executed in coarse-grained Thasian white marble. The shaft of the column is surrounded by 24 flutes. the architrave is high and the low frieze is decorated by ox skulls and rosettes: the dentils above this are large in proportion to the cornice, the pediment cornice is thin and the pediment plain. The capitals have volutes²⁴⁷ decorated by scroll ornament, as in Sardes.

Note 247. See Hauser, Benndorf, and Niemann.

32. The so-called Old Temple on Samothrace, of which merely the foundation courses remain. The frieze was adorned by dancing female figures, the cornice had dentils, and the cyma was decorated by lions' heads and anthemions: the antefixas ended at the edge of the cyma with palm leaves. The relief frieze is in the Louvre.²⁴⁸

Note 248. See Gonze, Hauser and Benndorf. Vol. 2. pls.8-10.

33. The Temple in Lokri. On the site of an earlier temple of an order no longer to be determined, stood the peripteral building with an elongated cella, pronaos and opisthodomos, on a substructure of three steps, whose blocks were in a single external layer, but were doubled and clamped together at the angles. The surrounding portico had 6 x 17 columns, which were connected with the stylobate with dowels. The intercolumniations between axes differed on the ends and sides, the former being 10.4 and the latter 8.66 ft.

Pronaos, opisthodomos, and also the porticos, had pavements of stone slabs laid on a grating of beams. No stone of the cella wall remains in place now, and only mere fragments of the columns are to be found. Their bases recall by their form those of the Heraion on Samos: the shaft is covered by shallow flutes ending in semicircular form. above which is a necking ornament of anthemions. While on the Eretheion, this is separated from the flutes by a pearl bead, we find in Lokri a connection of these with the anthemion, since their downward points lie in the spandrels of the arc. Above each fillet rises either a lotus or a

palm leaf, as shown by Fig. 169. The anthemions were painted, and the underside of the slab over the necking was red, while the ground was generally left white, the edges of the lotus flowers were colored red, as well as the points turned downward toward the fillets between the flutes, the palm leaves were entirely red, as well as merely the margin of the covering leaf, from which the palm leaf springs.²⁴⁹

Note 249. See also the anthemions of the capitals in Naucratis and from Samos in Antiquities of Ionia. Chap.V. pl.6: 1-3.

²⁵⁰ The capital shows a broken line in the volutes with a convex volute band, like a capital of the Heraion on Samos and the recently discovered old Ionic capitals of Tschadri-dagh and of Messa (see Figs. 166, 197), then in the volute eye is a 6-leaved flower and on the surface of the bolster are vertically falling scales, whose upper surfaces are slightly hollowed between margin and rib. The abacus is plain in front, but on the sides are vestiges of an egg-and-dart moulding. Blue coloring was on the ground of the echinus and the sides of the pointed leaves.²⁵¹

Note 250. See the last Chap. V; pl.6: 4-5.

Note 251. See Petersen in Mitt.d.Kais. Deutsch.Arch.Inst. Athen Abth. Vol. 5. Athens. 1890. p.176-201; also Antike Denkmäler, published by Kais. Deutsch. Arch. Inst. Vol. 1. Berlin. 1891. Pls.51; p.40-42; lastly, Fig. 189. p.248.

34. Concerning the Temple of the Ionic order in Naucratis, Gardner published some remarkable details.²⁵² This archaic Temple, dedicated to Apollo, shows in its fragments of fluted and slightly diminished shaft, the Samian base of archaic character with a heavy round ornamented by scales and a beads above the round endings of the flutes, above which, as in Phoenician capitals, is given a kind of echinus band with overlapping recurved leaves, on which the volute bolster must have rested. The upper portion will then will not be unlike the stele capital from the Athenian Acropolis. (See Fig. 167).

Note 252. See Naucratis. Part. 1. 1884-5. By W. M. Flinders-Petrie, with chapters by Smith, E. Gardner, and Barklay V. Head. Third Memoir of Egypt. Explor. Fund. London. 1886. Pls. 3,4; also Part 2 by Gardner with an Appendix by F. Ll. Griffith. Sixth Memoir of Egypt. Explor. Fund. London. 1888.

Other portions exhibit the necking ornamented by anthemions without a separating pearl bead and with the like arrangement of the flowers as on the Temple in Lokri.

The second Temple of Apollo there shows in its fragments the pearl bead and scale border beneath the anthemion.

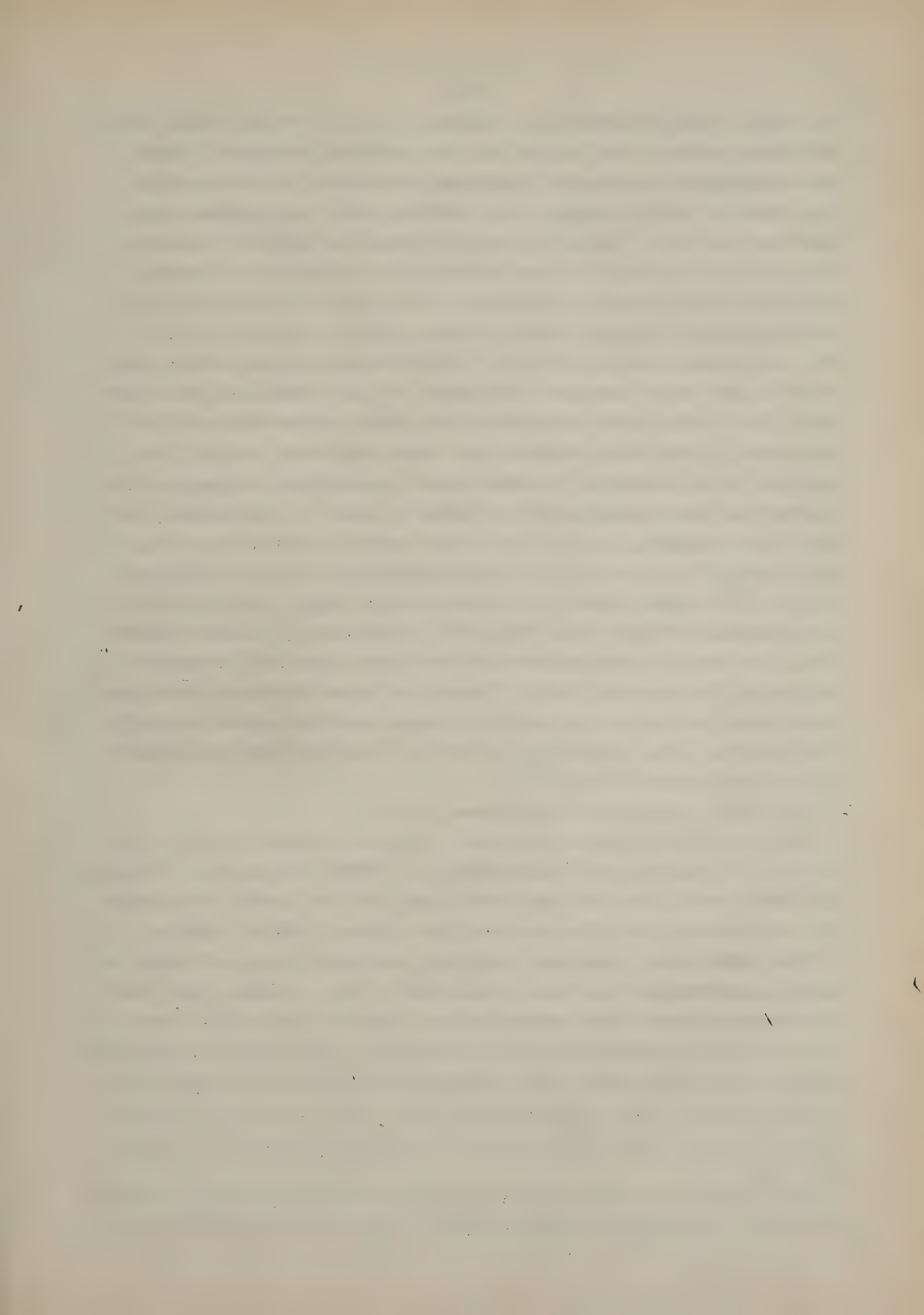
35. Concerning the Ionil Temple on the Theatre Terrace in Pergamon, something is to be found in the following sources. ²⁵³

Note 253. Bohn, R. Vorläufiger Bericht über die Ergebnisse der Ausgrabung zu Pergamon. Jahrb.d.Preuss.Kunstsamml.Berlin. 1888. pp.43-8.

36. The Temple of Apollo Chrestorios in Aegae was built of brownish trachyte and lay on a slightly elevated terrace. Before this are the remains of a great flight of steps leading to the Temple, which are preserved. The Temple probably had columns on the facade, of relatively good workmanship. These had a height of about 24.6 ft. for a lower diameter of 2.72 ft.; the mouldings of the base are Attic, and the capital is without necking. The architrave is divided in three bands, the frieze is lower than that, is ornamented by ox skulls and garlands, and the cornice has dentils, not rectangular, but curved in the form on an echinus moulding. The dedicatory inscription indicates the year 48 B.C. ²⁵⁴

Note 254. See Bohn and Schuchardt in Alterthümer in Aegae. II Ergänzungsheft d. Jahrb.d.Kais.Deutsch.Arch. Inst. Berlin. 1889. p.46-9; Figs.57-67.

37. The Temple in Neandria on the Tichigri-Dag, where Clarke found the peculiar Ionic capital illustrated in Fig.166, was regularly excavated by Koldewey. It consists of a substructure 42.21 × 84.33 ft., on which stood the cella without external columns, enclosing a room 26.24 × 65.01 ft., which was divided into two longitudinal aisles of equal width by a central row of 7 columns. The foundation was placed on the solid rock and is composed of two courses of irregular stones, separated from the regular masonry by an interposed course of stretchers .66 ft. thick. But the foundations of the columns are of granite blocks, while the columns themselves are of Liparite. The floor of the cella was 1.25 ft. below the threshold of the doorway; one must therefore have descended into the Temple. Access to



the cella was afforded by a doorway 4.17 ft. wide, whose threshold was at the same height as the external pavement. From the fragments discovered, Koldewey succeeded in determining the form of the interior, the ceiling, and the columns supporting the roof, which especially recalled Persian columns. (Fig.198). The capitals are composed of a series of leaves, cymatium, and volutes, and crown the plain and strongly diminished shafts without bases, whose lower diameter is 1.74 ft. and upper one is 1.31 ft. The capitals are not alike and also do not show the same treatment of the front and rear faces. The former must therefore have been turned towards the entrance, since they exhibit the more perfected style. The capital with ascending volutes above a cymatium ornamented by leaves is then established in three places, in Kolumdada, Aegae, and Neandria, and it is to be termed Aeolic-Ionic. The horizontal Ionic volute is then contrasted with the vertical Aeolic, ⁴⁹¹⁻to which should be added a third form, the Cypriote intersecting volute (See Fig.166). According to these discoveries, the Aeolic type existed at the same time and independently of the archaic Ionic; "they are three branches from the same stem, of which the Aeolic bloomed earlier and withered". The capital from Boghaz-~~koi~~²⁵⁶ cited by Fuchstein may be regarded as the parent of all.

Note 256. Same work as before, p.58.

The ground plan shows the most intimate connection with the so-called Basilica in Paestum (See p. 204); the earlier Temple in Lokri must have had the same form, and we should recognize in this two-aisled plan perhaps the oldest form of temple.

The architrave, cornice, ceiling, and roof, were of wood. A main longitudinal beam was supported by the columns, and the transverse beams then rested on this and on the walls, even if the ceiling and roof did not coincide, when the columns supported the ridge-beam. The volutes were therefore placed at right angles to the longitudinal beam, just as on the Persian capital, the beam rested between the projecting bulls and not on them.

The covering of the roof consisted of flat red tiles, 1.74' x 2.76 ft. with hollow tiles to match, the lowest course having a

turned-up margin with peculiar water-spouts (Fig. 198). The ridge was covered by hollow tiles, which had a finial according to the fragments found, as on the Heraion in Olympia, while the hollow tiles were closed on the edge of the gutter and showed sculptures on the closing surfaces. (Fig. 198, E). A cyma ornamented by small figures extended along the pediment (Fig. 198, D), recalling the similar treatment on the older Artemesion in Ephesus.

38. Details of the so-called Tomb of Sardanapalus at Tarsus may be found in the source mentioned below.²⁵⁷

Note 257. Kolderey. Aus der Anomia. Berlin. 1890. p. 178.

199. Closing Remark.

As an Ionic internally uncovered temple design, we have mentioned that at Miletus (Fig. 192) and have suggested the possibility of a small uncovered court in the peculiar ground plan of the Temple in Phigaleia²⁵⁸ but the examples of Ionic so-called hypaethral temples are thereby exhausted, even if these are indeed to be regarded as such in the meaning of Vitruvius. The hypaethral arrangement is now in most recent years accepted for the temples of other orders, particularly on the evidence of Vitruvius and the discoveries at the Olympeion in Athens by Penrose, though strong dissent by Dörpfeld exists.

Note 258. Mitt.d.Kais.Deutsch.Arch.Inst.Athen.Abth.Vol.16 heft.3. Berlin. 1891. pp. 334-344.

Chap.3. The Corinthian Order.

a. Development.

200. General.

The Corinthian order does not appear with entirely characteristic forms, like the Doric and Ionic; it is rather based on the two last styles of architecture, that earlier attained maturity and perfection. But "it is likewise archaic and prehistoric in its external characteristics".²⁵⁹ The most distinctive characteristic, the column with the bell capital, already occurs in Thebes in Egypt on the splendid buildings of the 19th dynasty (1447 to 1273 B.C.); but we likewise find it on Sculptures in Nineveh, as well as very ancient additions thereto in the Grottoes on Thera, and again recalling the design of the

latter, on the great Temple outside Miletus in Ionia, also on ancient remains found on the southwest coast of Asia Minor and made known by Newton, on the Grecian mainland in the Temple of Apollo at Phigaleia²⁶⁰, on the Asclepion at Epidaurus and in other places.

Note 259. See Semper, Braun, Reber, etc.

Note 260. In regard to the building of this Temple, see Baumeister, Vol. 3, pp. 1319, 1320.

201. Theory of Vitruvius.

Vitruvius states that the capital was invented by the sculptor Callimachus²⁶¹; maker of the golden lamp in the Erechtheion, who was busied as sculptor, architect, carver, and also as painter, and he relates the well known myth concerning it, of the nurse that placed a basket of flowers covered by a tile on the grave of her young mistress in Corinth, which was then surrounded by a sprouting acanthus plant, and it thus furnished the motive for the new form of capital to Callimachus passing by. He then made the Corinthian column after this model, which fixed the harmonious proportions and the principles of the building of structures of the Corinthian order.²⁶²

Note 261. Probably from Athens; lived about the 93 d Olympiad (464 B.C.).

Note 262. See Vitruvius. IV. 9, 10.

In the fourth book, he further states, that the Corinthian order itself has no special rules for the cornice and the other decorations, "but either employs modillions on the main cornice from the arrangement of the triglyph members with drops on the entablature after the Doric style, or a frieze with dentils, adorned by reliefs, and a cornice according to Ionic principles".

Thus from the two orders, to which was added a new capital, a third order was created for the style.

202. Characteristics of the Order.

But this novelty in form did not merely consist in the arrangement of the cornice, nor in the use of the Egyptian bell capital, and which was in the later period to supplant the other orders, but in the elastically poised frieze, that according to Semper, is treated "as a gently poised wave, which elastically

receives the load of the frame of the ceiling and transmits it to the architrave".

203. Appearance and Extension.

In accordance with what has been said, the marks of the appearance and acceptance of the new style are found in those monuments, in which the different orders occur together, in the interiors of the Temples at Phigaleia and of Miletus, the Tholos in Epidauros and the Philippeion in Olympia, the Arsinoeion on Samothrace, the Temple of Athena Alea in Tegea, but only in the period of Alexander did it find general acceptance and become the prevailing order; after the complete destruction of the independence of the Grecian states and people, it was fostered and cultivated by their splendor-loving masters.

204. Remains.

The remains of this order left to us are scanty, both on Hellenic (European) and likewise on Asiatic soil; but precious evidence of this most sumptuous architectural style are preserved for us in the graceful Choragic Monument of Lysicrates in Athens and in the Temple of Olympian Zeus, located on a high terrace in the lower city of Athens, a monument, that in magnitude and splendor, in beauty and massiveness of materials, seeks its equal in all ages, and whose construction continued for six and one-half centuries (it was finished 650 years after the laying of the foundationstone), although with interruptions, from the Pisastratides until Hadrian.

We wonder at the entrancing and delicately membered details on the one, the slender columns of scarcely .98 ft. in diameter, and on the other at the gigantic shafts of about 656 ft. diameter and nearly 55.76 ft. height, as well as the marble beams of the architrave over 21.32 ft. long.

Exactly as in the Doric and Ionic styles of architecture, we here likewise find the same forms, sometimes on the most graceful little architectural structures, sometimes on the mightiest colossal temples.

205. Material and Polychromy.

The material employed on most Corinthian monuments in Greece and Asia Minor is white marble, whose fine crystalline grain is particularly suited for the skilful execution of the numerous

small sculptures and ornaments.

Polychromy generally becomes of less importance in the works of this style in comparison with the two others. Color³¹⁴ decoration here chiefly gives place to relief ornament; the use of perishable colors must in time yield to the mode of natural ornamentation with colored stones, and thus to a monumental polychromy.

The gilding of certain parts may perhaps have been more commonly employed, than on the buildings of the Doric and Ionic orders.

b. Form and Construction of the Chief Parts.

206. Substructure.

1. The Substructure. The temples of this order likewise stand on a substructure of several steps, that is constructed of smooth blocks of stone in the manner already described; this is either the plain rectangular form of step, or that with a small rebate on the lower angle of the step, like those already found on the Doric Temple in Nemea.

On the upper corners of the steps of the Temple in Labranda, echinus mouldings are said to occur, but these were found in such a damaged condition, that their original form can no longer be determined with certainty, and they also give occasion for the conjecture, that they are merely the vestiges of the bosses for protecting the exposed angles, which had not been dressed off. (Fig. 199).

The only remains of larger temples of this style are those of the Olympieion in Athens, and those of the so-called Temple of Zeus in Labranda; the steps have entirely disappeared at the former and the substructure no longer remains in its original extent; only 13 columns at the southwest angle and 2 of the inner row on the south side still stand erect, a third having been overthrown by the storm of 1852. The steps of the other are now in great part concealed by rubbish and ruins, so that their number cannot even be determined. Under these circumstances, there can be no consideration of any "curvatures", or of their intentional or unintentional existence; the 4 + 3

283 columns in the front row on the south and east façades of the

Olympeion are no longer in condition to afford measurements to $1/25$ inch.

207. Cella Walls.

2. Cella walls. Likewise but few remains of these exist, but which do not differ in form and structure from those previously described. In accordance with Ionic prototypes, the cella walls in Labranda rested on bases, which had the same profile as the bases of the columns and antae, and they were terminated at top by a special cap.

The walls were indeed absolutely vertical, in accordance with the position of the columns.

208. Doorways.

3. But few fragments of doorways are preserved. The finds in Labranda are 20.24 ft. high, exhibit rich mouldings, and like an architrave, are divided into three bands with pearl beads, echinus moulding and cove. (Fig. 200).

209. Columns.

4. The columns are divided into three parts, as in the Ionic order, for they consist of base, shaft, and capital; they are not inclined toward the cella wall, but are accurately vertical and are of slender proportions, like the Ionic with slight diminution and entasis.

The lower diameter of the column goes into its height (including base and capital) as follows:--

On Olympeion in Athens	8 $\frac{4}{5}$ times.
On Monument of Lysicrates	10 $\frac{7}{10}$
On Temple of Zeus in Labranda	9 $\frac{1}{2}$
On Temple of Claudius Caesar in Ephesus	10 $\frac{1}{2}$

The upper diameter is from $1/7$ to $1/6$ less than the lower. The base is usually the Attic Ionic on a square plinth; the mouldings are sometimes plain, sometimes decorated by interwoven bands, or laurel leaves then cover the torus. Including the plinth, it is equal to or rather higher than the lower diameter of the column. (Fig. 201).

of Semic. Section

287 After the Ionic system, 24 flutes surround the shaft of the column, are separated from each other by fillets, and end in rounded form at top and bottom. In Labranda and elsewhere, a part of the scotia is occupied by a tablet, on which the name

of the benefactor at whose cost the columns were erected and finished, and whose meaning is, for example:--

"Leon Kointos, son of Leon, dedicates as Stephanophoros this column with its base and capital, as he promised"

On the Monument of Lysicrates, the flutes exceptionally end in the form of recurved leaves; a plain groove between these and the lower row of leaves on the bell of the capital was indeed originally filled by a metal band. An astragal, a round and fillet, the former decorated by beads on a column in Miletus, or treated as a band, as on the Olympeion, separates the shaft from the capital.

210. Capital.

"More refined and slenderer" than the Ionic, according to Vitruvius, for its height including the abacus, but without the astragal, is little greater than the lower diameter of the shaft of the column, the capital is chiefly characterized by its bell form.

The low and tense echinus of the Doric and Ionic capitals, that expands under the weight of the entablature, is here replaced by a high moulding, that like the frieze, receives the burden and transmits it to the shaft.

The Egyptian prototype, imitated from the corollas of native plants, first bore no relief ornament; a circle of broad pointed leaves surrounded the bell at its base on the shaft; behind these extended to its upper margin closely set lancet-shaped leaves. (Fig. 202).

We find the same arrangement on one kind of Corinthian capital, that on the Theatre of Dionysos and on the Tower of the Winds in Athens, as well as on buildings in Asia Minor (Pergamon). But the plant ornament ornament is different; the Greeks chose for ornaments the plants native to their country, instead of the Egyptian flora, preferring those species that could be used in relief and were typical. A circle of acanthus leaves with narrow sedge leaves springing from behind them, and all wrought in relief, composed the decoration. But neither for the Egyptian capital, nor for the Greek, was the load laid directly on the bell; a square slab was interposed between the bell or basket (calathos) and the architrave.

This abacus does not project beyond the edge of the bell in the former; in the second, it projects in accordance with Doric models, and is not shaped like a heavy slab without ornament, but as a delicately moulded and not very high (measuring about $1/6$, or according to Vitruvius, about $1/7$, the height of the capital) covering slab, whose sides abandon the straight line and in gently curved lines intersect sharply at the angles, or are there cut off.

285
286 The diagonal of this abacus sometimes equals twice the height of the capital, and sometimes is rather less. (Vitruvius requires in Fig. 203, that $b c = 2 h$, while on the Olympeion, the length $b c$ is less than $2 h$. he makes the rise of the arc = $1/9 b d$, while in many cases it is considerably less).

The profile of the abacus is either an echinus moulding with fillet and cove, or an echinus moulding with fillet, cove, and another fillet. (See Monument of Lysicrates in Fig. 203).

The bands (astragals) of the square bell capital were merely painted, were in relief in the Ionic style, and are treated as rounds with fillet and apophyge, as shown.

211. Volutes.

Besides this simple painted decoration of the bell, there already occurs at an early date in Egyptian Thebes a second and richer ornamentation thereon, which combines relief with painted ornament. Four of the large leaves enclosing the bell extend up to its top and there curve downward like volutes (Fig. 203); the spaces produced between these leaves near the top of the bell are adorned with painted ascending forms. In a still tasteless manner, we find this arrangement of the ornamentation of the capital on the capital found in Rhigaleia, though entirely changed into relief; merely the abacus here remains heavy and is painted in the archaic manner. (Fig. 202).

The volutes conceal in the most beautiful way the underside of the triangular corners of the abacus, projecting beyond the edge of the bell, and appear to support these projecting parts.

A freer treatment is shown by the capitals of the half columns from Miletus, which must be classed with the most beautiful of this order. Two rows of acanthus leaves, eight in each, are so arranged that the mid-ribs of the upper row fall in the

intervals of the lower one, and surround the bell for about $\frac{2}{3}$ the height of the capital; behind these spring forth 8 volutes (helices), which meet in pairs beneath the angles of the abacus, while 4 palm leaves ornament the corresponding angles of the bell.

A similarly more perfect development appears in the capitals of the half columns of the Choragic Monument of Lysicrates (334 B.C.) in Athens. The movement of the leaves and of the helices is perhaps to be termed somewhat less fluent and affected in comparison with that of the capital from Miletus; (Fig. 202); the entire capital rather bears the stamp of a sculptor's experiment.

289 The capitals of the Olympeion in Athens exhibit the form, that became typical later, with two rows of acanthus leaves, the helices resting on them, and the flower rising above the abacus.

New light has been cast upon the history of the Corinthian capital by the finds at the Tholos in Epidauros, a work of the younger Polycleitos, who worked about the middle of the 4th century.²⁶³

Note 263. See Robert, C. *Archaeologische Märchen aus alter und neuer Zeit in Phil. Unters.*, pub. by Kießling & F.v. Wilamowitz-Möllendorf. Heft. 10, p.198. "We know nothing whatever concerning the family relations of the younger Polycleitos. The tradition, that he was the pupil of Naukydes, is chronologically even possible, but is very doubtful. --- That he was the architect of the Theatre and of the Tholos of Epidauros appears probable from the architectural forms of both buildings." Also see Foucart. *Edifice d'Epidaure*. Bull.d.Corres. Hellen. Athens and Paris. 14th year.(1890).p.592-594; "Pausanias mentions as most remarkable the Theatre and the circular edifice, termed Tholos, both works of Polycleitos. It is known that there were two famous sculptors of that name; Polycleitos the elder, who flourished in the 5th century, and Polycleitos the younger, who lived in the early part of the 4th century. Brunn (*Gesch. d.Griech.Künstler*, I, 2^d edit., p.152, 162, Stuttgart, 1888-9) attributes them without hesitation to Polycleitos the elder. This opinion has been commonly expressed, but is not based on

any proof."

The stone-cutters' marks found on the ashlar of the Tholos show that the Tholos is of the 4th and not of the 5th century, and it is further stated concerning a fixed date:— "Hence the Tholos was built after the Temple of Asclepios. The latter was erected before the year 352, probably about 375, but one cannot go beyond that date. The construction of the Tholos was undertaken afterwards, perhaps immediately, perhaps some years later. In any case, it is the work of Polycleitos the younger, and not that of Polycleitos the elder, same as the Theatre".

Everyone will agree with the conclusions stated in Note 263 above, who has seen and carefully examined the architectural details of the Tholos. The forms have no relation to those of the 5th century, and we see that the capital was first more widely accepted in the Greek mother-country in the second half of the 4th century. (Epidauros, Tegea, Olympia, Samothrace; Figs. 204, 205).

264 The erroneous view expressed by Bötticher²⁶⁴ was indeed caused by the doubtful statements of Brunn (see his work), that the Corinthian capital of the Tholos in Epidauros was about 100 years earlier than that of the Philippeion, and it is indeed to be considered as rejected.

Note 264. *Cent.d.Bauw.* 1885. p. 236.

After its precedence in Rhigaleia (430 B.C.?)^{and Delphi}, the capital indeed appears in a tasteless form still, but already much more importantly developed (350 B.C.) in Samothrace, and a few years later in Olympia and on Samothrace. Since Scopas is considered a contemporary of the younger Polycleitos, each combined the talents of a great architect and of a sculptor; then the capital on the Temple of Athena Alea in Tegea mentioned must have had the same date of origin as that in Epidauros.

Vitruvius requires for the lower part of the capital the same diameter as that of the upper end of the shaft, excluding the apophyge and the astragal.

The capital is treated alike on all four sides, whether the bell is decorated by volutes or not, and it again adopts the general relations of the Doric capital, since it shows the same free suitability for peripteral designs. To this fact,

combined with its beautiful form, is indeed due its supremacy over all other forms of capital in later times, even until the present!

212. Polychromy.

Polychromy only participated in this sculptured work so far that the ground of the bell received a darker tone, bluish or reddish brown, while the leaves, volutes, and flowers were partially or entirely gilded.

213. Construction.

The columns are monolithic on the smaller monuments; on the larger, they are constructed of separate drums, like those of the other orders, and which are not always of equal height.

On the Olympeion in Athens, the shafts are composed of 14 drums of unequal size, the capital being made of two blocks in its height, while the round bases and the square plinths are cut from a single block.

Notwithstanding their considerable diameters, the drums are not set upon each other merely in the manner previously described, as on the Parthenon and other temples, but according to the Ionic model (see Erectheion and Temple of Cybele in Sardes) are connected by iron dowells for the same reason, the slenderness of the shafts of the columns. Sometimes two of these, or sometimes four, are set in a drum and are employed in the manner shown by Fig. 206; small pouring grooves for introducing the fluid lead again lead to the dowell holes.

214. Spacing the Columns.

The spacing of the columns is just as free and independent as in the Ionic order, the distances between the axes are all equal to each other and have dimensions similar to those on Doric and Ionic temples.

The distances between axes of the colonnade on the Olympeion exceeds that of the middle passage of the Doric Propyleion in Athens by only about $2\frac{1}{4}$ ins. The spacing on the Temple in Labranda in Asia Minor is wider than on the Olympeion; on the former, the diameter of the column goes into the axial distance 3 times, and only 2.8 times on the latter. (Fig. 207).

215. Half Columns and Piers.

Besides the detached columns, half columns are also employed

in this order as in the Doric and Ionic, and which are either directly attached to the cella wall (see Choragic Monument of Lysicrates) or to rectangular piers, as on the Tomb at Mylassa, this combination producing a peculiar kind of isolated pillar. (Fig. 208).

Free square piers likewise occur on the same monuments together with these coupled half columns, and in the sepulchral chamber are plainly wrought blocks without capital and base, above which short corbel-like projecting stone beams, like the caps in wooden construction, form the transition to the stone ceiling beams. The piers at the angles of the superstructure, like the Ionic in Priene, are divided into three parts like the columns and diminish upwards like them. Capitals and bases are imitated from those of the half columns, the former with two rows of acanthus leaves laid on the bell, behind which are or spring forth elongated sedge-like leaves; the surface of the shaft is fluted as on the columns.

216. Antae and Pilasters.

The antae (front piers) as well as the pilasters (wall piers) are adopted in the Corinthian order, but as they are found on Doric and Ionic monuments (See Akragas, Priene, Miletus). We find them generally divided into three parts and that these members are treated as on the columns, so that the bases exhibit the same profiles, and the volute capital has been simply transformed from the round to the flat.

The shaft is plain, or a border with sunken panel occurs thereon as an innovation and is without ornament, unless the inscription engraved thereon in some cases may be so regarded. (See Hadrian's Gate, Monument of Philopappus in Athens, and Doorway in Mylassa).

291 As a beautiful example of an anta capital, whose form was derived from an adjacent column capital, may be taken that one still preserved in fragments, which belonged to the Propyleion in Eleusis. Winged lion-rams with lion's paws project above the circle of acanthus leaves beneath the angle of the capital and are joined together by beautifully entwined scroll ornament; the abacus is curved inward as on the capitals of columns, and it has a slight outward swell at the middle, which ends in

a slightly projecting block. (Figs. 209, - 211).

Note 265. See *Die Propyläen des Appius Claudius Fulcher in Eleusis*. from Drawings of J. Durm in *Zeits.f.Bauw.* 1876. p. 487 et seq.; Pl. 63. Also Michaelis. A. *Das sogenannte Dreifusskapitell von Eleusis*. *Mitt.d.Kais.Deutsch.Arch.Inst. Athen.* Abth. Vol. 14. Athens. 1889. p.9; lastly, Lenormant, F. *Antiquités d'Eleusis*. *Rev.Gen.d'Arch.* 1868. p.101-8, pls.1-3.---
 "The Dilettanti found the two antae capitals very much mutilated. We (i.e., Lenormant and his associates) have uncovered them anew, together with a well preserved capital of a column, which had escaped the English examination.---The lower part is ornamented by a row of acanthus leaves, from which spring at the angles the forms of winged chimeras with lion's paws and head, to which are added ram's horns.

The heads of animals are wanting in the capitals published by the English architects and they have been made griffins!"

It remains singular that Michaelis (see his work) always speaks of "griffins" in spite of these facts, and notwithstanding the publication referred to, in the *Rev.Gen.d'Arch.* and in the *Zeits.f.Bauw.*

According to the researches of Michaelis, Dörpfeld, and Kraus, these capitals with their peculiar form of abacus did not serve for supporting votive gifts (see Michaelis, p.10), as for example, Bötticher maintained. Our deductions from Lenormant are therefore correct.

217. Tripod Capitals.

Columns of this order, that were employed to support votive gifts, frequently experience a change in the form of the capital in accordance with the shapes of these offerings, as for example, in case of a tripod placed thereon, the abacus of the capital assumes a triangular, instead of a square form. The sides of the abacus were then similarly curved inward, and the acute angles were cut off.

On this idea is based the most beautiful of all tripod supports, the unfortunately much injured crowning marble finial of the Choragic Monument of Lysicrates with its series of water-leaf, acanthus, and of the most magnificent volute scroll ornaments, that has even been created in art.

218. Acanthus.

The acanthus is sharply cut on all greek monuments, the entire leaf being always divided into separate symmetrically arranged parts, which consist of a group of 3, 4, or 5 or more ^{3 1/2} delicate and pointed separate leaves, separated from each other by strongly projecting bands. The leaf extends upward in beautifully curved lines; its apex is gently recurved without thereby producing the effect of being broken or wilted; elastic and full of life, it closely adheres to the form of the bell.

The acanthus represented in Fig. 212 was drawn from a fragment found in Athens and illustrates the treatment of the different parts. A capital exhibited in the former Museum of the Theseion in Athens shows the whole leaf and is at the same time an example of the degree of "ossification", to which the magnificently inspired motive of the bell and volute capital could sink. (Fig. 213).

213. 219. Assyrian Bell Capital.

Since the Egyptian bell capital was in the beginning introduced as a basal motive for the Greek Corinthian, it should finally be mentioned, that the same likewise already occurs on Assyrian relief sculptures, although in a far more uncertain and indefinite form. (See the collection of Assyrian capitals by G. Rawlinson).

220. Architrave or Epistyle.

5. The architrave is imitated from the Ionic, has a crowning moulding like that, and its front surface is subdivided twice or thrice; the lowest bands were then frequently small and unimportant in comparison with the upper one (See Labranda); the face turned toward the cella wall is frequently lower than the front side, and the under surface is generally decorated by a narrow sunken panel.

There is no ornamentation on the fascias; but for example, on the Choragic Monument of Lysicrates, these were ^{1/2} recessed for the dedicatory inscription.

According to the magnitude of the monument, the beams are constructed of one, two, or three pieces in their width, and on some monuments, they consist of two or three blocks side

by side; their greatest known length is 21.49 ft. (See Olympeion in Athens and Fig. 214).

The jointing and connections of the ashlars were done in the same manner as in the orders already described; the inside beams are mitered at 45° , while the outer ones abut at right angles; the use of iron dowells and cramps set in lead was very extended.

294. 221. The Frieze.

6. As in the Ionic order, the frieze is plain or bears sculptures, but in either case is from $1/2$ to $1/3$ lower than the architrave. (See Olympeion, Monument of Lysicrates, Incantada in Salonichi, Labranda, Mylassa, Ephesus). But the plain flat form of the Ionic frieze is likewise abandoned, and the characteristic innovation is introduced instead, that consists of an elastically curved frieze, as already mentioned. It is at Labranda swelled in a convex line, while in Salonichi, Mylassa and Ephesus, the form of the bell of the capital is repeated. The curved frieze then generally remains plain or is merely decorated by plant ornament, though vertical so-called pipes ornament the frieze of the Incantada. (Fig. 215).

222. Main Cornice.

7. The main cornice is either taken unchanged from the Ionic order, is treated as a dentil cornice (see Monument of Lysicrates, Labranda, in Fig. 216), or there occurs here another characteristic innovation, the addition of modillions between the dentils and the projecting cornice. These were moderately large horizontal projecting beam ends, as on the Olympeion, subdivided into two parts in height, surrounded at top by an echinus moulding, were plain brackets, as on the internal cornice of the Tower of Winds at Athens, or richly ornamented volute modillions, as on the Temple in Ephesus. (Fig. 215).

In many cases, all members of the main cornice, such as the projecting cornice, cyma and intermediate members, are covered over with sculptured ornaments, continuing and completing the richness of bases, capitals and frieze. The main cornice of the Choragic Monument of Lysicrates received a very effective crowning ornament in the series of arched and connected, closely set antefixas, placed on the upper edge of the projecting cornice

like a crown.

223. Pediment Cornice.

8. The pediment cornice. The inclined cornice of the pediment received the same members as the horizontal cornice, to judge from the portal pediments of the Tower of Winds in Athens, on which the dentils were likewise employed on the inclined pediment cornice in a way scarcely to be justified technically,²⁸⁶ as well as from the most important monuments of the latter period, on which the pediment is frequently preserved for us, while it is usually destroyed on similar Grecian monuments, and never remains in fragments.

Note 286. Vitruvius (Book 4, Chap. 2, 5) maintains that the "ancients" did not approve and therefore never introduced the use of ends of rafters or dentils on pediments, yet the Tower of Winds, built about 100 years before Vitruvius, is not exactly evidence of the accuracy of the statements of the Roman architect.

224. Tympanum.

9. The tympanum must have been distinguished by figure ornamentation, and its angles and apex by acroterias or figures, in accordance with the earlier motive of the Doric and Ionic orders.

225. Ceiling and Roof.

10. Although the monuments of this order belong to a later period, few data concerning the ceiling and roof remain, like those of the other orders, scarcely anything of them remaining for us. Merely the ceilings of small secular buildings still exist, of the Tower of Winds and of the Choragic Monument of Lysicrates.

c. Monuments.

226. Monuments.

1. The Temple of Apollo Epicurius in Phigaleia, built by Ictinus (480 B.C.), architect of the Parthenon, contained a single column of the Corinthian order in its interior before the cella with the sacred statue. (For the capital, see Fig. 201).

2. In the Temple of Apollo Didymaeus not far from Miletus, dating from the time of Alexander, were found half columns of the Corinthian order, that belong to the most beautiful examples of that order.

3. At the Temple of Athena Alea at Tegea, built by Scopas about the middle of the 4th century, Corinthian columns stood in the pronaos. (Also see No. 8 under Art. 158).

4. The Philippeion in Olympia, built about 337 B.C., had in its interior Corinthian columns, according to Pausanias, and this was confirmed by the excavations.

5. The Olympeion in Athens was a decastyle (10 × 21) dipteral structure containing altogether 120 columns, and it occupied a very ancient sacred place, was begun on a high artificial terrace in the lower city of Athens by the Pisisstratides 530 B.C., its foundations being completed by the architects Antistates, Callaischros, Antimachides, and Porinos., then abandoned on account of political disquiet and again taken in hand by King Antiochus IV 400 years later, who promised to bear the entire cost himself, and who had "the grand cella, the double colonnade around it, the entablature and the other ornamentation, executed by a Roman citizen, Cossutius, according to suitable proportions and with the greatest skill and highest understanding; but this work has a name, not merely in general, but even among the few greatest monuments". He counts it among the temples, "whose splendor and ingenious restoration aroused astonishment, even in the council of the gods". (See Vitruvius, Ek. 7, introd. 15, 16, 17. "A temple in the country, unfinished on account of its magnitude", according to Livy).

But even Antiochus did not see the Temple completed; Hadrian alone brought it to an end in 135 A.D., after Sulla had previously taken some of its columns to Rome. (86 B.C.).

The ground plan of the Temple is no longer to be made out with certainty. White Pentelican marble served as the building material; the retaining wall of the terrace was interrupted by buttresses, was about 2460 ft. in length (1/2 mile) and was built of stone from Piraeus (See Fig. 44). The shafts of the columns were approximately 55.76 ft. high, and the architrave blocks were 21.49 ft. long; 16 columns remain, partly with their architraves; 15 are still standing, one having fallen during a storm in 1852. ²⁶⁷

Note 267. Later excavations by Fenrose have uncovered a portion of the substructure built by the Pisisstratides. See Bevier.E.

Papers of the American School at Athens. Vol. II. p.188 et seq.

6. The choragic monument of Lysicrates in Athens is a small round structure of white marble, pseudodipteral with 6 half columns, on a square substructure about 13.12 ft. high and built of stone from Peiraeus, covered by a cap of bluish Eleusinian marble. The ashlar have a sunk border along the bed joints, while the vertical end joints are not so marked. The walls of the ^{super}structure are composed of tall slabs and terminate in a frieze-band at the height of the capitals, ornamented by tripods in low relief. The frieze above the architrave is decorated in the most beautiful manner by a figure composition, representing the well-known myth of the transformation of the Tyrrhenian pirates into dolphins, who had seized Dionysos.

The roof is cut from a single block, its outer surface ornamented by leaf-ornament like scales, and crowned by the magnificent acanthus finial mentioned in Art. 217, intended to receive the metal tripod. Three beautifully curved scrolls corresponded to the feet of the tripod and extend from the finial outward on the surface of the roof. The inscription on the architrave states that Lysicrates with a chorus of boys won the victory. (335 B.C.).

Fig. 217 affords the desired information concerning the present condition of the monument.

7. The Tower of Winds in Athens, or more correctly, the Horologium of Andronikos Kyrrhestes from Kyrrhos in Syria, was built about 100 B.C. of white Pentelican marble, and was intended to support a weather vane and to contain a sundial and water-clock. It is an octagonal building of moderate height about 22.96 ft. in internal diameter, on the northeast and northwest sides being portico with pediments and 2 columns each, and having on the south a choir-like, semicircular projection. The eight sides of the building are turned toward the points of the compass, and on each side above the terminal band of the wall is sculptured a flying figure, which represents in work of very ordinary execution the wind corresponding to that side. The figures are each executed on several slabs, and their heads and wings intersect the architrave members in a very awkward way.

The apex of the roof was decorated by a triton, which was movable and indicated with a staff the wind then blowing.

The lines for the sundial still remain, cut below the reliefs.

247 The cornice is stumpy and rude in form, and the cyma is ornamented on each side by 3 lions' heads: (Fig. 219).

A channel conducted the water from the spring Clepsydra to the circular projection, that contained the water reservoir. The vestiges of the water clock are still visible on the floor. Beside this monument are still standing arches made of ashlar, which were formerly regarded as belonging to an aqueduct to the little building, but which according to later researches belonged to a separate structure. The arches are not built of voussoirs; the small span, and the marble of which they are constructed, quarried in great blocks, indeed permit the omission of the usual construction of the arch. They are cut from rectangular blocks of stone, yet not in a complete semicircle, with plain soffit and decorated by archivolts profiled like an architrave; a rosette adorns the spandrel, a motive that Bramante loved to use in the Renaissance. Above these arches were an architrave and cornice, portions of which still remain in place. 268

Note 268. On various pieces belonging to this, the remains of inscriptions have been found, which refer this building to the imperial period, soon after Augustus. See Dessau. Mitt.d.Kais. Deutsch. Arch. Inst. Athens Abth. Vol. 7. p.398-400. Athens. 1882.

The piers are treated in a peculiar manner, for on the front surface and in accordance with the archivolt resting thereon, an ornamental subdivision is arranged at their centers. Here the sides are no longer parallel, but diverge; the separating portion is cut with a broken surface in order to make possible an intersection of the returned profile of the cap of the pier. (Fig. 220).

The interior is subdivided in its height by two richly profiled cornices (Fig. 218), a plain band course supporting the upper columns at the angles, and an architrave band above this; the ceiling is composed of 24 stone beams resting against a central block in the manner illustrated by Fig. 11. The columns and antae at the entrances have no bases; but the enclosing wall has one, consisting of apophyge, fillet, and torus. The antae

are not connected with the masonry, but are set against it; the capitals of the antae exhibit in their remains the same, or a form allied to that of the capitals of the columns, a row of acanthus leaves with sedge leaves extending from them to the top of the bell. The execution of both is rude in comparison with the similar capitals found at the Theatre of Dionysos. The shafts of the columns are fluted, but those of the antae are plain. Only a short portion of an anta still stands, as well as two portions of the shafts of columns extending to a man's height; the jambs of the doorways still remain, but the capitals, architrave, cornice, and pediments of the portals are entirely detached from the building and are in great part destroyed.

The walls are built in courses of marble slabs 1.67 ft. thick and of various heights, and are still in good preservation, with the exception of some cracks. The setting bosses left in the flutes of the columns have already been shown in Fig. 77. The architrave and frieze of the portals are bonded into the wall; the pediment merely abutted against it. How far iron was employed in this fixing can no longer be determined in the present condition of the monument. Two steps of the stylobate are still in place and to be seen; the third is covered by the soil.

8. The Monument of Philopappus on the Museion hill near Athens (between 114 and 116 A.D.), built of white Pentelican marble as the Tomb of the uncle of King Antiochus IV, the last King of Commagene, is merely mentioned by Pausanias in these words:-- "A monument was later erected to a certain Syrian here" (On Museion hill).

Built in the form of an exedra, the monument was in perfect condition in the 15th century, if a drawing of Cyriacus is to be believed, while it today only remains in ruins. ²⁸⁹ The sub-structure is built of Piraeus stone without mortar, 5 courses being visible; on this rise in curved form the fragments of a boldly designed marble base, over which is a relief with figures, below that being Philopappus as Consul in a quadriga, etc., allied indesign to the reliefs of the Arch of Titus in Rome. A cornice terminated this lower structure, above which 3 niches were arranged between 4 pilasters or piers; the middle semicir-

semicircular ^{niche} arch is still preserved, as well as the figure sitting therein, now headless, of Philopappus, son of Epiphanes. The niches on the right and left were rectangular at top, like windows; the former with the remains of figures therein is still preserved, but the third has entirely disappeared. Side piers flanked the semicircular niche, one of which, with an inscription and a good acanthus leaf, still remains, while merely the base of the other is yet preserved.

A part of a pier with plain front and base still stands beside the rectangular niche and supports courses of stones as well as a piece of the architrave, cut from the same block as the plain frieze, and also a short cornice slab extending deep into the masonry. ^{270.}

Note 269. In the Barberini Library at Rome.-- Concerning this draught, see remarks by Reich in Mitt.d.Kais.Deutsch.Arch. Inst. Athen. Abth. Vol. 14, p. 222. Athens. 1889.

Note 270. Concerning date, inscriptions, and illustrations, see Mommsen, same work, Vol. 1 (1876), p. 36; also Köhler, same work, p. 126.

9. The Gate of Hadrian in Athens formed the entrance to the precinct of the Temple of Zeus Olympios and to the new quarter of the city founded by Hadrian. "This is the City of Hadrian and not that of Theseus" is on the frieze on the east side, while "This is Athens, the ancient City of Theseus" is on the west side.

Built of white Pentelican marble, this has a round-arched gateway about 21.32 ft. in clear width, that was formerly flanked by two Corinthian columns, whose bases remain on the west side and their architraves on the east side.

The columns stand directly before the wall without pilasters behind them. The masonry consists of a high plain base-course (as on temple cellas) with a slightly projecting low band above it; then follows the masonry in regular courses, the surfaces of the ashlar being separated from each other by rectangular sunk joints. The angles of the wall project like antae, are dressed smooth on their faces, are finished with Attic bases and ugly Corinthian capitals, that have a freely projecting and unloaded egg-and-dart moulding above the astragal, with covering acanthus leaves only on the angles. The soffit of

the arch made of small voussoirs is smooth; the archivolts are divided into two bands, bordered by an echinus moulding and cove, and they rest on the plain piers with Attic bases and Corinthian capitals. The arch intersects awkwardly the architrave and a part of the frieze; the crowning cornice is treated as an Ionic dentil cornice.

More beautiful in proportions and nobler in detail is the richly designed upper part; it is composed of an entablature supported by side piers and half columns, producing three rectangular openings, the middle one being crowned by a pediment. The dentils of the horizontal main cornice are also used along the pediment cornice, as on the Tower of Winds. Acroteria bases on the pediment are still preserved.

10. The so-called Incantada in Salonichi (Thessalonica) is a work, whose purpose remains unknown. Pococke holds it to have been a monument of victory; Villoison, the entrance of a theatre, Clark, the propyleion of an ancient hippodrome or forum. According to Perrault and Durand, who held the only building allied to this to be a basilica, the "Tutelles" in Bordeaux, now entirely destroyed, this designation should be adopted. In the notes to the German edition of Stuart & Revett's work, it is explained as being a tomb, similar to the Tomb at Mylassa.²⁷¹

Note 271. Die Alterthümer von Athen. Darmstadt. 1829-31. Vol. 2. p. 507. For Salonichi, see also Kinch. L'Arc de Triomphe de Salonique. Paris. 1890.

The designation now current is taken from the common tradition, that holds the building to be the remains of a gallery connecting two palaces of Alexander, explaining it as a work of magic, therefore receiving from the Greeks the name of Goeteia, or from the Spanish Jews settled there, that of "Las Encantadas" (magical diagrams).

The ruins stand in the Jewish quarter of the city and consist of 5 Corinthian columns, monoliths of cipolline, that support an entablature of Pentelican marble, whose frieze exhibits the characteristic curved form ornamented by pipes. The cornice has Ionic dentils; above it rises the attic story of the same material adorned with figures. (See Figs. 182, 215).

The protecting projections on the abacuses of the capitals are remarkable, which at the time were held by Stieglitz to be

the "scamilli impares" of Vitruvius. The good style of the figures and moldings allow the building to appear to have been erected not later than the era of Antoninus, thus being not later than 193 A.D.

11. The Propyleion of Appius Claudius Pulcher in Eleusis was a structure of Pentelecan marble with the charming chimera capitals, (See Figs. 209, 211) now only remaining in fragments. This "small" Propyleion at the second (reckoning from the outside toward the interior) enclosing wall has side walls at right angles to the wall containing the gateway (see plan, Fig. 43), which were decorated by Ionic columns, while the antæ and columns beside the principal entrance bear Corinthian-like capitals (represented in Figs. 209 - 211) with the acanthus bell, c chimeras at the angles, and scrolls, flowers and berries at the middle. The scroll ornament there does not exhibit the fluent form, as on the Choragic Monument of Lysicrates, although contrary to widely distributed and incorrectly restored publications; it is no longer permeated by the chaste fragrance of Grecian beauty of form of the good period, and in the unfolding of the flowers and in the berries, for example, recalls too much some violent turns on the really late ornament of the table supports in the House of Rufus in Pompeii, which is certainly the work of a Grecian artist.

Lencormant²⁷² ascribes this small propyleion to Appius Claudius Pulcher from inscriptions found there and deciphered by Henzen. Two nephews of the censor had the propyleion, vowed by their uncle, built during their sojourn in Athens, and the uncle dedicated it shortly before his death (48 B.C.). Those propyleions, whose parts are composed of all the orders, are therefore of earlier date, than that mentioned on page 250 under 5, the "great" Doric Propyleion, which according to the result of Lencormant's excavations and evidence, originated in the 2d century A.D. and after the reign of Hadrian.

Note 272. Rev. Gen. de l'Architecture. 1868. p. 54.

12. The so-called Gymnaseion, or more correctly, the Stoa of Hadrian in Athens,²⁷³ built between 114 and 137 A.D., included in itself a state edifice, porticos, a library, Temples of

Zeus and of Hera, and a Sanctuary of all the gods. The foundations are partly preserved with a part of the superstructure, a piece of the wall with 7 monolithic columns of Carystos marble (cipollini) placed before it, 3.18 ft. diameter and 30.90 ft. 30/ high, with greatly injured acanthus capitals of Pentilican marble, and one fluted column with its anta, which belong to an entrance portico.

Note 273. See Stuart & Revett. Die Altertümer von Athen. German edition. Darmstadt. 1829 - 31. Vol. 1. 173, tief.4, pl. 7 to tief.5, pl.6; also Boumelter. Vol. 1.p.169. Extensive excavations have been recently made, which have fixed the ground plan of the building. See Praktika tes Arch. Hetair. 1885. Pl.1. 1886. p. 10, 11.

Three columns and one anta likewise remain from the Temples mentioned.

13. The Temple in Labranda in Asia Minor was a hexastyle building with 11 columns on its longer side; the plan consisted of a peristyle, pronaos, naos, and opisthodomē; the floor of the vestibule was one step higher than that of the portico. (Fig. 221).

Of the Temple, built of white marble, there still stand 16 columns, supporting the architrave and a portion of the frieze, while the cella and the roof are destroyed. The columns standing on the south side are not fluted, the bases of the antae are only roughed out, the mouldings on the architrave and frieze are still plain and without ornament, a token that the Temple was never entirely finished.

The previously mentioned tablets (Art. 204) on the shafts of the columns and on the convex frieze are worthy of notice. The cyma is nearly destroyed, but decoration by lions' heads is still recognizable; the steps are covered by rubbish and ruins, so that only the uppermost one is visible, and their number cannot be determined.

14. At the Tomb at Mylassa, the portico still stands on a bold rectangular substructure, an entrance to which leads to the interior, whose stone-beam ceiling is supported by plain piers. On the superstructure, 4 angle piers, between which are 2 peculiar coupled half columns on each side, bear the archi-

architrave with the frieze of ogee form, from which rose the stone ceiling in the form of a stepped pyramid, constructed by corbelling. Columns and piers are fluted for two-thirds of their height and exhibit in even more debased execution, as on the Tower of Winds, the form of capital found in the Theatre of Dionysos in Athens.

15. A Gateway at Mylassa shows similar capitals and cornice members and the twibill of Zeus is cut on the keystone of its archway.

16. In Mylassa is likewise found a votive Column with a rich, though mutilated, acanthus capital, that once supported a statue, with a tablet in the flute and the inscription:- "To Menandros, who was himself a benefactor of his country and was descended from benefactors".

17. Remains of a Temple near Ephesus, dedicated to Claudius Caesar at his deification, with richly ornamented entablature and frieze of ogee form.

18. The Corinthian peripteral building with 6×9 columns on a terrace in Pergamon measuring 196.80×224.68 ft., was entirely built of white marble and had a width of nearly 65.6 ft. and a length of more than 108.24 ft. The cella was that of a so-called temple-in-antis; the height of the columns was 32.14 ft., including base and capital. Bronze rosettes were attached between the horizontal modillions of the main cornice; the middle and side acroterias were shaped like leaf-covered bells, from which scrolls ascended, and on them stood winged victories. The temple court was enclosed by three one-story porticos, the eastern and western of these being only raised on three steps, while the northern rested on a podium 13.12 ft. high. The capitals of the columns of the porticos exhibit the same ornamentation by acanthus and sedge leaves, as on the Tower of Winds in Athens.

272 Two separate monuments also stood in the temple court, a rectangular and a semicircular seat, the former built by Attalus II, according to the inscription. Fig. 222 gives a representation of it with the adjacent porticos. ²⁷⁴

Note 274. Facsimile reproduction from Bohn, *Alterthümer von Pergamon*. Vol. 2. Berlin. 1885.

19. Here should also be mentioned the different, and often very rich architecturally, Scene Buildings of the great theatres in Asia Minor, which were chiefly executed in the most luxuriant corinthian style.

20. There should lastly be mentioned as a movable work of architecture, the Palace-Ship of Ptolemy Philopator, with its great peripteral saloon and its columns of cypress wood with Corinthian capitals of gold and ivory.

Chap. 4. Building Materials, Prices, Wages, and Erection.

227. Finds.

The uncovering of antique temples has been carried on at a grand scale during the last ten years, and this has not a little increased the material of inscriptions referring to buildings, whose meaning partly casts new light upon various arrangements, but has been able to decidedly enrich our knowledge of the various technical processes.

The well known Lex Puteolana, the contract for building a covered gateway to Puteoli, instructs us concerning the construction of a wooden projecting roof and its covering of tiles, whose lowest course was to be fastened by iron nails; the contract for the repair of the city walls of Athens afforded information relating to a kind of roof sheathing and a layer of straw and earth; the detailed description of the work for the Arsenal in Piraeus informs us about a simple roof, with the support of the roof ridge-beam by stone piers, and all dimensions and spans of timbers, together with the doubled sheathing of the roof and the coating of clay on this, the building contract of Lebaëa gives the conditions of the agreement, the inscriptions of Delos and Epidauros describe the various kinds of materials, the places of origin of building materials, the construction of wooden coffered ceilings, the gilding of lilies and rosettes in the coffers, the ornamentation of framed doors with ivory, the glueing of wooden parts, the protecting coating of the same, the tarring of the roof tiles, the public letting of the work at the lowest price, and the wages of the workmen and the superintendent; the inscriptions of the Erechtheion inform

us concerning the erection of the marble frieze, the construction of the ceiling of the cella of Athene Polias, the roof of the cella of Erectheios, the various painters and sculptors' work; others give facts relating to similar monuments in Eleusis, Troezen, Hermione, Tegea, Corcyra, Eretria, Lesbos, Piraeus, and other places.

228. Prices of Materials and Wages.

Those points of especial importance to building construction have already been referred to in the preceding chapters relating thereto; the following details may be added in regard to materials, prices of material, and wages.

229. Building Stones.

Of the kinds of stone chiefly employed in the Grecian mother country, the following are to be mentioned.

1. The bluish-gray compact limestone, frequently veined with yellow to reddish-brown, iron-colored calcareous spar, from the quarries of Lycabettos, from the Areopagus, the Hills of the Nymphs and of the Museion, was more commonly employed in the earlier period before the Persian War (Pelasgian walls and foundations of the old Temple of Athena on the Acropolis of Athens).
- 323 2. The Kara stone from the vicinity of Athens, a light white porous limestone, colored red or reddish in spots by iron nodules, frequently similar to travertine, was sawn into ashlar. (Foundations of the old Temple of Athena and of the Parthenon of Cimon).
3. The limestone from Acte (Aktites lithos) at Piraeus, of yellowish-gray to yellow color, a fresh fracture being white to light-gray, was chiefly used for foundations, but for the superstructure as well, as shown by the Odeon of Herodes Atticus and the Theatre of Dionysos. 101.
4. Conglomerate stone, a kind of breccia, with white fracture, easily cut and sawn; mostly employed only in the middle of walls.
5. The compact limestone from Eleusis, of dark gray or brownish color, was mostly used only for certain parts of buildings, sometimes only for decorative purposes on account of its color, at others on technical grounds by reason of its

hardness. (Uppermost step of the staircase of the Propyleion in Athens; window sills in the same building; frieze of Erectheion).

6. The lower white and the upper blue-gray Pentelican marble from the quarries above the demos of Pentele were employed as a building stone for great public edifices, especially during the time of Pericles. (Olympieion, Propyleion, Temple of Nike, Parthenon, Erectheion).

7. The lower white and the upper blue-gray marble from Hymettos were more used during the period of Roman supremacy.

8. The coarse-grained Island marble from Paros and Naxos was relatively little used in Athens. (Roof-tiles in Olympia; relief-frieze of the Theseion).

9. The upper and lower White Attic marble was quarried and employed near Laurium and Sunion.

10. The gray, yellowish and red compact limestone of the chalk system and the limestone-conglomerate in the circuit of the Plain of Argos were especially employed for the prehistoric structures in Mycenae and Tyrins.

11. The light-bluish-gray and also the yellowish-gray marble from Doliana were used on the Temples in Tegea, Phigaleia, and also in Olympia.

12. The tertiary shelly calcareous sinter limestone was easily wrought while fresh and was sawn into ashlar; most buildings in Olympia (Temple of Zeus, Heraion, Palaestra, etc.) were built of it, as well as the Temple in Corinth.

There were further employed for building purposes:--

13. The marble from the Valley of Cinus near Sparta.

14. The marble from Atrax in Thessaly.

15. The marble from Carystos and southern Euboea, the so-called Cipollino. This and the red and black marbles also were chiefly employed for certain parts of buildings, preferably during the Roman imperial period, for example for the shafts of the columns of the so-called Stoa of Hadrian, and for the Exedra of Herodes Atticus in Olympia.

Note 275. See Lepsius. Griechische Marmor-Studien. From Abth. d. Kön. Preuss. Akad. d. Wiss. z. Berlin. 1890. Berlin. p. 11-51, 114-133; also Gottgetreu, G. Ueber die antike Marmorsorten, ihr Vorkommen, und ihre Verwendung in Alterthum. Zeit. f. Bauw. 1888. v. 103-132;

Also Durm. *Ueber die natürliche rostbraune Färbung des Marmors an den Bauten der Akropolis in Athen. Same work, 1871. p.471; lastly, Becke. Min.u.Petrag.Mitt. Pub. by S. Tshermak. New Series (1879).p.57.*

The white marble of the locality chiefly came into use for the buildings on the soil of Asia Minor.(Ephesus, Sardes, etc.), while trachyte was also used for the older monuments(Assos).

In Sicily and Lower Italy, only the white-light-gray or yellow tufaceous limestone mentioned under 12 was considered. (Akragas, Paestum, etc.), which was always received a coating of stucco.

Walls of sundried bricks were protected by a coating of stucco on the external surfaces. Examples of this are the City Walls of Eleusis and of Athens; statements of the burning of bricks are at least not found in the building accounts.

Chopped straw was mixed with the clay. Accounts for this, as well as for calves' hair, clay, fine and coarse sand, and for broken stone, are still preserved. But nowhere in the ancient period do we find expenditures for slaked lime, since the cut stones were held together by wooden or metallic dowells or cramps, and air-dried bricks were set in clay mortar.

304. For preliminary outlining on stone or wood work, red or black colors were employed, items for this being preserved in the building accounts.²⁷⁶

Note 276. See Choisy. *Etudes Epigraphiques sur l'Architecture Grecque. Paris. 1884. p.215-228.*

230. Mentions of Places and Prices for some Building Materials.

For a Temple built of tufa on Delos, the tiles were brought from Syros and cost 15 ¢ per pair, exclusive of freight and duty; adding these, they came to somewhat more than 18 ¢. Clay bricks (air-dried) were each one ft. long and 1/2 ft. wide, costing \$7.20 per thousand; of which \$6.48 was for making and 72 ¢ for value of materials. A Corinthian tile cost at the factory there 15 ¢ and 18 ¢ delivered in Athens. The ordinary tiles made elsewhere had the same price as the Corinthian, exclusive of the cost of transportation.²⁷⁷

Note 277. One obolus equals 1/6 drachme or is 3 cents.

Up to \$14.40 was paid per cubic foot of cedar wood; elm wood varied in price between \$1.44 and 3.60, as well as ash wood.

The day's wage for a workman, who boarded himself, amounted to from 27 ¢ to 36 ¢, and even 45 ¢. It exceptionally fell as low as from 18 ¢ to 22 1/2 ¢.

According to the building accounts preserved, the building woods employed in various Attic buildings were cedar, elm, ash, and cypress. Olive wood was also used for dowells. (For example, in the Walls of Athens). They were largely brought from Macedonia, but the greater part was purchased in Corinth in the form of sills, beams, posts, pillars, piles, plates, or rails, boards and thicker planks. The wooden dowells and anchors were coated externally with tar, as well as the wood-work of the roof and the joiner's work. The latter was also varnished with a resin. (Mastic varnish?).

The timbers for building usually have large dimensions, for example, the ridge-beam of the Erechtheion, which was 20 ins. wide and 23 1/2 ins. high at the side (thus not to the top line), as may be deduced from the recessed apex stone of the pediment, lying on the Acropolis. According to the contract for building the Arsenal near Zea, architraves 30 ins. wide and 27 ins. high were required, with planks and boards 6 ins. wide and 3/4 to 1 1/2 ins. thick.

231. Specifications for Erection.

Specifications for the construction of buildings are thorough and frequently circumstantial, taking account of all possibilities.

Against lazy contractors, the officials in charge of the building always reserve the right to carry it on under their own management, if the former do not fulfil the requirements of their contract.

Proof of this statement may be found in the following specifications for work for the Temple of Zeus at Lebadea in Boeotia, which date from the beginning of the 2d century B.C. It was found in the year 1875, cut on a marble tablet 6.07 ft. high, 3.12 ft. wide, and 8 ins. thick, filling two columns side by side, with 94 lines and 8500 letters.

It was first submitted to scientific criticism by Fabricius

in the Essay "De Architectura Graeca commentationes epigraphicae" (Berlin 1881). It was made known to professional circles by the Centralblatt der Bauverwaltung (1882, p.5, 11). Choisy, the well known French writer on architecture, treated the same subject under the title:-- "Un Devis de Travaux Publics a Livadie"(Paris. 1884).

We give a verbatim translation from Fabricius as follows:--

1. (If the contractor fails to complete any part of the work undertaken by him, then will the Building Commission for the Temple afterwards omit this portion). The contractor then has to repay to the Building Commission for the Temple (the money paid him in advance) and the fifth part of the entire sum, for which he has undertaken the execution of his part of
305 the entire works. (This money), together with any extra costs, and with the amount of the penalty imposed on him, shall all be collected from the contractor and his bondsmen by the Building Commission for the Temple. If this cannot be done, then shall their names be posted on the "white board".-----We, (the Building Commission for the Temple) award all metal-work, and of stone-work, the making of the slabs for inscriptions and of the caps at the same prices; but he (the contractor) shall make the foundation bases as extra work. For the limestone ashlars, he shall receive the fixed price of 5 drachmas (90 ¢) each, for as many as he delivers, and for the cutting and painting of the letters, one stater and 3 oboli (\$3.69) per 1000 letters. --- But after he has received the advance payment, the contractor shall forthwith (commence and) execute the work within 10 days, by engaging therefor at least 5 skilful workmen as assistants. But if he fails to perform any stipulation made in the contract, or is convicted of an error, then shall he be as severely punished by the Building Commission as he appears to deserve, for not performing the contract stipulations; and if one of his assistants be convicted of an error, he shall be discharged from the work, and be no longer permitted to assist; but if he be disobedient, then shall both he and the contractor be punished. ----- If it be found advantageous during the work to change any of the prescribed dimensions by increasing or diminishing them, then shall he execute it in accordance with our directions.-----

---But the original bondsmen and the (first) contractor shall not be discharged from their obligations, until he, who has undertaken the work awarded the second time, shall have furnished sufficiently safe bondsmen. For all works previously executed, the original bondsmen shall be responsible to the last recourse. The contractor shall in nowise injure works now in the sacred precincts. But if he should injure anything, then shall he make it good again at his own cost, during a time to be fixed by the Building Commission for the Temple. And if the first contractor, who has charge of the setting, spoils a stone, then shall he furnish instead another perfect stone at his own cost, without delaying the work. He must remove the spoiled stone from the sacred precincts within five days; if he fails to do so, the stone will then belong to the sanctuary. But if he furnishes no substitute and does not make good the injury to the building, the Building Commission for the Temple will also deduct this. The cost thereof and one-half more (additional) shall be paid by the contractor and his bondsmen. If a stone breaks in two of itself, then the contractor in charge of the setting shall receive no punishment on account of this stone.---If the contractors disagree in regard to one of the written stipulations, then after the members of the Building Commission for the Temple have been sworn, they shall decide the (case) on the spot. More than one-half their number must then be present. Their decision shall be legal.---If the Building Commission stop the contractor from delivering the stone, they shall make good to him the time for which they delay him.-----After the contractor has given bondsmen according to the law, he shall receive the first payment on account for the portion of all inscription slabs undertaken by him, and for the caps lying thereon, when he deposits the tenth part of the entire (sum as security). After he has shown that all (slabs and caps) are completed, are true on all sides, finished according to the contract and set with lead, to the satisfaction of the Building Commission and of the Architect, then shall he receive the second payment on account for all letters of the inscription, according to the fixed price and according to the number computed on the basis of the original, when he likewise deposits the tenth part

of this (sum). Finally, after he has completed the entire work, and after this is accepted, he shall receive the tenth that was deposited. Also for all limestone ashlar set by him, as well as for all letters cut by him afterwards, he shall receive the fixed price together with the tenth, unless some deduction be made as a penalty. --- If any extra work be required for the benefit of the building, he shall execute it according to the same rate, and shall receive what is coming to him therefor, after he has shown that it is good. --- If it happens that the excavation be not firm, he shall then pave it with as many limestone slabs as are necessary, and shall likewise receive what is due him therefor, together with the tenth. --- But he shall also place 11 caps on the inscription slabs already existing, after he has cut the slabs on top, and has extended the existing scaffold as we direct. He shall remove the iron cramps already let into the slabs, when they project and hinder the cutting, and after deeper holes have been drilled, he shall reset them and cast them properly with lead. He shall further insert in these (11 caps) keyed dowells and cramps and cast them in with lead, and shall finish everything as already described above. --- We award also these caps, those 6 ft. long and 5 ft. long to be at the same price the others cost; those 3 ft. long, 4 in number, we will count each two as a single cap. --- He will likewise receive payment on account for these caps, when he has shown that the inscription slabs are cut, set, and cast in with lead, and that the caps placed on them are clamped above. He shall also receive payment for these, after depositing one tenth, exactly as stipulated above. --- After he has joined together the caps, and has shown that they are true, set with lead, complete, are clamped on top and range perfectly with each other, then shall he wash the inscription slabs with soda, clean and wash the letters, for so long as we require. --- But everything else, not mentioned in this agreement, shall be done according to the law and to the (general) ordinance for building the Temple.

2. After the contractor, who by means of (open) tender of the Building Commission for the Temple, has undertaken to prepare and set the pavement slabs along the long side for the Tem-

Temple of Zeus "King", and for the external passage around the cella on the side toward the south, to be of hard Lebadean stone, 13 in number, corresponding in size, breadth, and thickness to the pavement slabs already finished and set along the long side, beside which these are to be set, --- then after the contractor has delivered the rough stones, uninjured, near the Temple, and they have been found good and in accordance with the prescribed dimensions, he shall first dress the under sides of all stones true and out of wind, without defects and truly plane; and with a sharp and fine tooth chisel, he shall dress all parts, which are to rest on the sills, and (those parts set on the filling) between the sills, for a width of at least two feet from the front edge joint; but the middle portion still uncut is to be dressed with a coarse tooth chisel, and he is to make everything true to a straight-edge, at least as long as the stone to be cut, and not less than 6 fingers thick and 6 inches high. Then he is to chisel away from the under side of all pavement slabs that portion, which lies above the filling, from the rear edge joint for the given length and width, dressing the cut surface true as particularly specified for the under side, thereby producing an open space between the dressed surface and the filling, not more than a little finger in depth. --- But he shall likewise dress all the rear edge joints of the pavement slabs entirely true, straight and not curved, without defects, plumb, perfect by the square, accurately cut, and indeed for the width of at least 9 fingers on the three margins with a smooth, sharp, broad chisel, carefully applying the red chalk test, but shall cut the yet untouched middle portion with the coarse tooth chisel, and he shall (then) undercut all the rear edge joints as at a door (using therefor) a stone straight-edge and carefully making the red chalk test, not without correcting all straight-edges by the (stone standard) straight-edge preserved in the sacred precincts, as often as we direct. He shall likewise cut the (front) ledge joints of the pavement slabs already in place, against which he is to set (the new ones), after he has stretched the line on the upper surface straight from the left, both in the portico, as well as along the longer side,

and after he has drawn the line in presence of the Architect, he shall cut away the existing allowance for cutting with the mallet (and chisel), thus producing the given width, and making everything true and with sharp angles. He shall further true up the upper edge of all the pavement slabs, 18 in number, already set by means of a straight-edge 20 ft. long, 6 fingers thick and 6 inches high, and shall test them with red chalk, using a smooth and sharp wide chisel therefor, and shall make everything straight, without defects and quite true, for a width of at least (9) fingers. (He shall dress this flat margin) after he has first cut gauge spots near the joints on each stone, true with the square and the stretched line, according to which the dressing is done. In the same manner shall he also work to the line (stretched) in the portico. Then shall he undercut the edge joints of the pavement slabs already set, against which he is to set (the new ones), as at doors, and to fit the stone straight-edge, exactly as specified for rear edge joints. --- Before he sets the stones, he must dress the sills and the filling stones on the upper surface, using the sharp fine tooth chisel on the sills, but a blunt chisel on the filling, corresponding to the finished and set (parts), and he shall show that everything necessary has been dressed. --- Then he shall set the pavement slabs according to directions, commencing to set them at the left, as will be indicated to him; each stone against an edge joint, setting a wedge between them, so that it accurately fits on top against the finished and set slabs. And he shall use pure oil and Sinope red chalk for all straight-edges. If he does not use Sinope red chalk and pure oil, then shall he be punished by the Building Commission for the Temple and the Bēotarchs; neither shall he set the stores permanently, until he has proved to the Building Commission for the Temple, 307 that he has used good Sinope red chalk and pure oil. --- He must show the dressing and jointing (of the slabs) to the Architect, and the edge-joints and under sides of all stones to the Assistant Architect, while they are being moved; (he shall indeed) rub the under sides with olive tree sap, and as soon as (the stores) are correctly set, neither bruised nor in wind, (but rather) faultless, nothing scattered beneath them, and they

fit against each other accurately, while he in the dressing cuts away the (high places) of the portions to be dressed with a fine tooth chisel made sharp, so far as they rest on the sills, or with a blunt chisel, where they rest on the filling; but he shall rub the edge joints with pure oil and use a smooth broad chisel made sharp. When the work is finished and the joints have been washed with soda and rinsed off with pure water, he shall fasten (the stones). The insertion of dowells, cramps, and double-dovetails, as well as their weight, and all setting in lead, shall be proved to the Building Commission for the Temple by the contractor personally; he shall not set anything permanently without this proof. But if (in spite of this) he does set anything, then must he raise it up again and set it anew; he shall then be punished by the Building Commission for the Temple and the Bōotarchs as severely as he appears to have deserved, had he not executed the provisions of the contract; and if one of his workmen be convicted of an error, he shall be discharged from the work and no longer be permitted to labor thereon; but if he be disobedient, then shall both he and the contractor be punished, and he (may) set no stone with lead, before he has fulfilled the prescribed decision. --- If it proves advantageous to the work to make any of the prescribed dimensions greater or smaller, he shall do this in accordance with our orders. --- As soon as he has set all the pavement slabs beside each other, he shall dress the ¹²⁾upper surface in the same manner as the bearing and finished ones, and true it off according to the great straight-edge, using red chalk and the tooth chisel, (first) cutting borders around the stones, and with a level extending them outwards from the guide spots existing on the pavement slabs, after he has prepared for this cubes of dry wood from the wild olive tree. And as soon as he has shown that everything is straight, entirely true -----.

232. Building Enclosure and Architect's Commission.

We deduce from the inscription found on Delos, that during the erection of a building, the building ground was enclosed by a wall of air-dried bricks, and that the average salary of an architect per year of 12 months was \$129.60, which was likewise paid to the foremen of the work. Hcmolle therefore wishes to under-



understand by *architekton* not the designing artist, but rather the superintendent. (He is an artisan rather than an artist, a mere superintendent)"²⁷⁸

Note 278. See & . . . Homolle. *Comptes et Invent. des Temples Deliens*. Bull. d. Corr. Hellen. Athens and Paris. 1890, 1886.

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Choisy, A. *Notice analytique des principales inscriptions relatives aux travaux de construction chez les Grecs*. Paris. 1884.

Fabricius. E. *Der Baukontrakt von Delos*. *Hermes*. Year 17 (1882). p. 1-23.

Fabricius. E. *Die Skeuothek des Phylon*. Same, p. 551-594.

B. SECULAR BUILDINGS AND TOMBS.

Chapter 5. Public Buildings and Designs.

a. Theatre.

233. Purpose.

"The Drama, far from being condemned by a jealous priestly caste, far more itself even served for the worship of the gods, and in every larger Greek city, a theatre was just as certain to be found as a temple."

Dithyrambs and divinely inspired songs were sung therein, and a separate Logeion and Theologeion were erected for the highest revelations of wisdom, or of fate. Poets here declaimed their verses before the people; it was honorable for any citizen of the state to support the theatre and an honored office by birth, or later of the monied nobility, was to undertake the supervision or arrangement of the chorus. The state provided for the actors, who were placed under the poets; it likewise made attendance possible for those without means. Plays were not given for profit, but for worship; until the period of decadence, till the wit and bitter criticism of Aristophanes appeared, the theatres were in truth temples of art, accessible to the entire people, the centre and focus of political, religious, and artistic life. They deteriorated as the people were overcome by the orient, or only found enjoyment in wrestling contests, chariot races, or in the murderous games of the arena, and these became the sole and the last art enjoyments, until Christianity likewise terminated them, after obtaining control.

1). Arrangement and Construction.

234. Origin and Development.

The beginnings of the Greek theatre are rooted in the worship of Dionysos. The dithyramb, the festal poem, that glorified the great deeds and the sorrows of the god, contained the germs of tragic poetry, while those of comedy are to be sought in the unrestrained songs of the festal jubilee and in the phallic hymns.

His deeds were sung by the line of dancers around the altar of the god; thus he formed the centre of the festal cel-

celebration and the centre of the festal place.

The space around it, on which the chorus moved, became the orchestra, the place for dancing. Adjoining this was the space for spectators, the theatre proper.

So long as merely alternation of the chorus and its leader expressed the dramatic play, these two divisions sufficed; a third one became necessary when the separate actors appeared.

Thespis introduced before 500 B.C. an actor not belonging to the chorus. The speaking then alternated between him and the leader of the chorus; the chorus then struck in less frequently with its songs. While the chorus then retained its place, a special place for the actors, the stage, was arranged behind the circular space for dancing and acting.

235. Elementary Parts.

Therefore a theatre had to satisfy three requirements: a level place for the chorus (orchestra, konistra), a place for the actors (skene), and seats for the greatest possible number of spectators (theatron). In order that the actors might be better seen, a raised place for their acting was arranged, a proscenion, a stage for the scene, at the expense of the originally entirely circular orchestra.

236. Building Material and Location.

The earliest theatres are assumed to have been built of wood, scaffolds placed in the open air for the temporary use of the actors and spectators; the orchestra was a level space strewn with sand, at whose centre stood the sacrificial altar, and tradition connects the building of permanent theatres with the frequently occurring fall of such scaffolds of boards.

It must be natural and probable, that where this took place, the means afforded by nature for a building were first utilized, and the slopes of hills were employed as the place for spectators. The necessary seats could thus be constructed without much labor, the orchestra was leveled off, and there was afterwards only the stage to be built of wood in the early period, in accordance with its origin; even in the later theatres, its floor continued to be of the same material, certainly required by the machinery of the theatre.

The Theatres in Athens, Argos, and Thoricos, exhibit this utilizing of the peculiar nature of such slopes. They were al-

always sought by the people, for why should not man make the most of the means, which seems to have been adapted to his purpose by nature, to have in a sense forced into use? The expense of foundations and walls, of extensive substructures, of the costly masonry of the facade and its ornamentation could be saved; by using the mountain paths as means of access to the upper rows of seats, expensive flights of steps were avoided. (See Theatre of Dionysos in Athens). Vitruvius likewise holds the location on mountain slopes to be good, on account of the construction of the foundation walls.

It was evidently for these reasons of economy, that the ancients chose such slopes as the site of the building, and not the fable of the natural stage or of the beautiful view, which on account of the artificial scene could scarcely be seen, and indeed not at all from the better places and the seats of honor. Texier already remarked in reference to this point, "that it is to be considered as a great mistake, that in any theatre whatever, landscape served as a background." A back to the stage was necessary for acoustic reasons.

Few Greek theatres are built on a plain, like those of Mantinea and of Alabanda; those in Myra and Aegai have partly utilized the rocky slope as a substructure, only the structures at the sides having masonry substructures and walls; the Theatre in Antiphellos is excavated in the mountain for a third of its extent, but is otherwise founded on the rock.

Vitruvius (Book V, Chap.3) requires first for the theatre "a healthy site, since the spectators will mostly be present there for long periods; it must not be exposed to the influences of the south; for as the sun fulfils his course, there is no possibility for the air to circulate, and enclosed within the curvature, it becomes hot and moist during the play, evaporates the moisture from the bodies and lessens it----". This arrangement does not always appear in existing monuments.

237. Form of the Theatre.

The forms of theatres remaining to us are not invariably the same, but in the fewest cases is the original one in all its parts. It originated during the course of more than 500 years, within which period the nature of the drama changed,

and with it also the arrangement of the building. Fashion and love of display on the one hand, and impoverishment on the other, gave occasion for alterations. Therefore in the fewest cases do the rules of Vitruvius accord with the practice on the site itself.

Vitruvius (Boog V, Chap.7) says:- "The form of the Greek Theatre is to be so arranged, that according to the magnitude of the diameter of the lower space, a circle is to be struck from its centre, within which are to be drawn at equal distances three squares touching the circle. Then where the side of one of these cuts off a segment, the limit of the stage is to be drawn, and parallel to this a tangent to the circle, on which is to be placed the rear wall of the stage. Likewise through the centre of the orchestra is to be drawn a straight line parallel to the proscenium, and where this intersects the circle (at o and p, Fig.223) on the right and left at the ends of the semecircle, the centre is then drawn, and after the dividers are set there and extended to the right side (to p), describe a circle from the left interspace (from o) to the left side of the stage (to r), and after setting the dividers on the left end of the semicircle (at o), describe a circle from the right interspace to the right side of the proscenium. (to s). Thus by the circumference described from these three centres, the Greeks had a spacious orchestra and the background of the stage was moved backwards, with a lesser depth of the framework of the stage".

The plans given in Fig. 223, of the Theatres in Iassos, Telmissos, and Aizani, do not agree with the preceding rule, just as little as the Theatres in Syracuse, Egesta, and Tyndaris, in which the orchestra exhibits the so-called open or straight horseshoe shape, or the Theatres in Epidauros and Mantinea, in which a circular segment of 185 to 260 degrees forms the orchestra. The previously mentioned Theatres in Athens, Argos, and Thoricos, deviate entirely from the regular form, since the shape of the rocky slope determined their forms.

238. Space for Spectators. (Theatre proper).

1. The space for the audience consists of a number of step seats, generally extending concentrically around the orchestra,

surrounding it in ever increasing circles and rising, so that a spectator may conveniently look over the others. Vitruvius prescribes 1 to 2 as the ratio of height to width of the rows of seats, but this is usually 4 to 7; the steps are frequently steeper than even Vitruvius' proportions produce.

239. Arrangement and Execution.

According to the same author, the rows of seats were interrupted by flights of steps extending upwards. These steps divided the audience space into wedge-shaped portions (kerkides); such a staircase corresponds to each angle of the squares drawn in the scheme of construction in Fig. 223, that adjoins the audience space. Yet in none of the examples represented does the execution of this rule occur; the stairways are needed and are built in greater number, unbroken and straight, without windings.

But the rows of seats were interrupted upwards, for broad concentric passages (diazomata) were added, that extend either singly or doubly, and parallel in the last case, one being higher than the other (see Epidauros and Patara). These concentric passages correspond in their proportions to the height of the theatre; for acoustic reasons, their walls must not be higher than their width. A straight line, stretched from the lowest to the highest step, must touch all angles of steps and of the dividing passages.

Most theatres have in their extent two such divisions or ranks, separated by concentric passages, with approximately the same number of step seats in each, and thus, for example, these Theatres have:--

Step Seats in:--

	1. Division.	2. Division.
Theatre in Myra.	27.	20
Theatre in Aizani.	16	Destroyed.
Theatre in Patara.	15	15
Theatre in Aspendos.	21	18
Theatre in Syracuse.	46 + 15	----
Theatre in Antiphellos.	26	----
Theatre in Telmissos.	28	-----
Theatre in Perga.	40	----

Note 279. Niemann & Petersen (p. 102) give 20 + 19 + 1 row on the diazoma or 40 seats in all.

Vitruvius requires in the second division additional flights of steps midway between the extended staircases of the first division, "and these must always be doubled in number in each successive division added", a rule that in reality is almost invariably never obeyed.

The seats were either cut in the solid rock (Argos), made of ordinary limestone (Myra), entirely of white marble or of both materials used together (Iassos, Athens, Corinth, Sparta), of gray marble (perga), plain or artistically carved, or ornamented by lions' paws.

The surface of the seats is cut lower at the back, so that the positions of the feet of those sitting higher are indicated, or they were hollowed out, as in Athens and Sparta, to firmly hold cushions. On the higher seats, the rolled toga or cushion was scarcely lacking on the seat of hard, cold stone.

The first row of seats frequently had high stone backs, sometimes artistically wrought, as in the Theatre of Dionysos in Athens (fig. 227), seats of honor for generals, state officials, foreigners, and native guests of honor. The Theatres at Aizani, Myra, and Side exhibit a raised passage around the orchestra beside the lowest row of seats.

Next the stage, the rows of seats were limited at the sides by a parapet wall, that followed in an inclined line, or in benches of the inclination of the seats. (See Theatre of Velia in Fig. 224).

The exterior near the uppermost row of seats was either formed by a plain wall, concentric with the rows of seats (Egesta, Onidos), by a portico, externally closed (Tyndaris, Laodiceia), or by an arcade portico, as in Aspendos. (See Fig. 234).

The walls were built of great limestone ashlar, without the aid of mortar or iron, faced with marble slabs (Aizani), were of white limestone likewise without mortar (Myra, Iassos), or were of rough blocks with a facing of marble (Cyzicos).

240. Dimensions.

The dimensions of the space for the audience were chiefly great, in accordance with their purpose of seating a great number of men; thus, for example, the theatres were:--

Theatre in Aizani.	183.68 ft. in diameter.
Theatre in Egesta.	206.64 ft.
Theatre in Iassos.	246.00 ft.
Theatre in Cyzicos.	328.00 ft.
Theatre in Syracuse.	492.00 ft.
Theatre in Laodiceia.	492.00 ft.

Among the greatest were the Theatres in Miletus and Megalopolis (see Pausanias, Book 8), the latter seating 44,000 men, while the Theatre of Dionysos in Athens seated 30,000, and that in Laodiceia could accommodate 10,000 spectators.

The most beautiful Theatre is admitted to be that built in Epidauros by Polycleitos, "the most important in proportions and beauty." (Pausanias, Book 2, 27).

241. Acoustic Vessels.

The voices of the actors should also be loud and clearly understood by the most distant auditors; but with the considerable dimensions and the uncovered location of the theatre, this does not seem to have always been the case.

The proposal of Vitruvius to make special arrangements in the theatres in order to increase "the distinctness of the voices" of the actors, certainly relates to this.

Therefore in theatres built of solid materials, i.e., of masonry of rough stone, ashlar, or marble, and which material cannot resound, he desires the arrangement of acoustic vessels in the audience space, that are especially designed to increase the distinctness of the tones, which proceed outwards in a semicircular form from the stage as a centre and enter the cavities of the acoustic vessels, thus producing by a combination of sounds a corresponding harmony. He indeed states that theatres were annually built in Rome without any attention to such acoustic vessels; he even says that none of these were to be found in Rome; but there were such in the provinces of Italy and in most Grecian cities. L. Mummius brought such acoustic vessels to Rome after the destruction of Corinth. But this arrangement is not mentioned in all ancient literature now known; only the anonymous author of the essay "*De fabularum ludorum theatrorum scenarium ac scenicorum antiqua consuetudine*" mentions them. ²⁸⁰ In the numerous known theatres on the soil of Italy, Sicily, Greece, and Asia Minor,

no acoustic vessels nor even vestiges of them have been discovered. One is therefore tempted to support Texier's opinion, according to which Vitruvius indeed speaks of his own invention, that was not adopted.

Note 280. See Des Vitruvius zehn Bücher über Architektur. Translated by H. Reber. Stuttgart. 1865. p. 147, note 1.

Vitruvius prefers bronze vessels, or if there be not sufficient means to provide these, then "resonant pottery vessels;" they should be made in proportion to the magnitude of the theatre, "and indeed so, that when they are struck, they can give in the separate vessels the tone of the fourth, fifth, and the entire series extending up to the double octave." They are afterwards placed in small cells built beneath the seats of the theatre, in accordance with their musical order, and so that they touch no wall, have space around them, with an open space likewise at the upper open end; they should be set inverted, and have wedges beneath them on the side next the stage, at least 1 1/2 feet high; corresponding to these cells, openings 2 ft. long and 1 1/2 ft. high are left in the beds of the lower steps. The arrangement of the sound openings "in the beds of the lower steps" makes the entire scheme very problematical in a filled house.

For theatres of not too great dimensions, Vitruvius requires 13 chambers separated by 12 equal intervals, in the height of the first concentric passage. The peculiar form of the substructure of the concentric passage of the theatre in Aizani exhibits 13 such divisions; one is tempted to assume these to be acoustic cells (Fig. 225), since the number and location corresponds with the statements of Vitruvius, and the restoration of the lacking parts may be easily made to satisfy the descriptions of Vitruvius; yet I might recognize in the division walls, cut from a single block, merely the supports of a row of seats, whose form was required by the conditions of the ground, the inclination of the step seats, and the plan of the diazoma. The statements concerning the discoveries of acoustic chambers, etc., in Scythopolis and Lyktos are now termed untrustworthy.

Vitruvius requires three horizontal series of chambers for great theatres, the first for the harmonic scale, the second for the chromatic, and the third for the diatonic scale.

242. Visual Distances.

The visual distances for the most distant spectators are no less to be mentioned, since they amount to:--

Theatre in Telmissos.	159.08 ft.	
Theatre in Patara.	160.72 ft.	281
Theatre in Aspendos.	177.12 ft.	

Yet the spectator easily comprises at a glance the orchestra and the stage, the "thymeliker" and "skeniker" (see Fig. 223); the spectator in the worst place would not be able to view such caricatures as the occupant of the highest row and of the front parterre in our modern theatres, in which the group of players are sometimes viewed in horizontal projection, or one may sometimes wonder at their chins and nostrils, while the foot-lights cast shadows upwards on their faces.

243. Orchestra.

2. The orchestra, the space on the level ground, was originally bordered by the "tent" (skene), later by the stage (proscenion) and the lowest row of seats; it was the place where the chorus stood, and it measured from $1/5$ to $1/3$ the entire diameter of the theatre. At its centre, thus nearer the stage than the audience space, was the thymele, the small choral stage derived from the altar of Dionysos. Side passages (paradoi) from 6.56 to 16.40 ft. in width, by which the chorus entered, led to the orchestra (see Theatre in Patara), which were accordingly closed by very simple means, probably often only by a latticed door.

Note 281. In the Grand Opera House in Paris, for example, the length of the visual ray drawn from the eye of the actor at the foot-lights to the furthest row of seats of the upper gallery is only 124.64 ft.

The ground was leveled with sand, covered by boards during performances, on which the places of the choir were indicated by lines. The Orchestra on Delos had a mosaic pavement, and the Theatre of Dionysos in Athens had a (later added) floor of marble slabs laid in a pattern.

Beneath the floor are found the channels for carrying away the water from rain, from cleaning, and that used for sprinkling in hot weather in the later period.

244. Scene.

3. The stage and the stage-building. A flight of steps led from the orchestra to the proscenion (Fig. 226).²⁸² Originally built entirely of wood, its floor should not be less than 5 nor more than 12 ft. above the orchestra, according to Vitruvius. It was a planked stage for speaking, beneath which was the hyposcenen, whose front bordered the orchestra, and which received the machinery, the arrangements for lowering, etc.

Note 282. From Mon.d.Inst.di Corresp.Arch. Vol. 4 (1844), Plate 2.

The proscenion was architecturally enclosed on three sides, the structure at the rear being the ancient scene proper, those at the ends being termed parascenes.

But little of this chief part of the ancient theatre still exists; the perishable nature of the materials and the continual changes permit the original form to be now scarcely determined; almost everything of the stage-buildings now existing dates from a later period.

The stage in the older works is entirely separated from the audience space, a mark of purely Greek design; it extends in the later to the theatre, or is architecturally connected therewith. (See Aspendos).

In some places (Syracuse, Sicyon, Egesta), it is partly cut in the solid rock, and in others it is constructed of cut stone, or is begun in the rock and extended and completed with dressed stones. The scene proper, the front wall of the building behind the stage, then generally represents a piece of splendid architecture, a palace facade with three or five doorways.

The outside doorways of the facade with five doors probably led to the side scene rooms, while the middle doorway, "that should have an ornamentation suitable for a royal palace" (Vitruvius), as well as the two side doorways (doors for guests) opened on the stage. The parascenes were of simple form; where these are lacking in a stage-building otherwise preserved, they were indeed of wood. The architecture of the scene in Aizani extended down about 5.9 ft. above the floor of the orchestra.²⁸³

Note 283. See Le Bas, pl. 6, 4. Niemann & Petersen give in Aspendos in their recent drawings no stone logeion at all before the stage wall (see Pls. 24, 27), but assume one of wood 5.25 ft. high for that place.

3/8 The stage wall is best preserved at the Theatre in Patara, (Asia Minor), dating from the era of Hadrian; it is still almost complete, the external facade being subdivided by Doric pilasters and in a simple yet ravishing style (Fig. 224).²⁸⁴ Five doorways led to the scene and beneath them in the hyposcenion were five doors to the machinery room. The corbels for supporting the series of beams in the logeion are still well preserved.

Note 284. Also see Texter.

The scene was protected overhead by a projecting roof (see Patara and Aspendos; the holes for the wooden construction of the roof still exist in the latter); the occurrence of the roof in the best period is uncertain.

245. Decorations.

But in addition to these monumental and permanent decorations, others of movable character were in use; large painted scenes were stretched before the rear wall and narrow side scenes were placed at the sides.

The latter were called *periaktes* ('turners') by the Greeks, according to Vitruvius, and were in the form of triangular prisms; on each side was painted a separate decoration, that came into view by rotating the side scene.

Pollux mentions that the ornamentation on the *periaktes* was partly of wood and partly of cloth, and was let down from above. According to Servius and Pollux, the decoration belonging to the scene wall was of cloth; so far as possible, this was stretched before the beginning of the drama; it therefore hung in front of the wall. The mode of fastening it is unknown.

We further know that Agatharchos painted scenes in the time of Aeschylus, according to Vitruvius, the same Agatharchos left a book on perspective painting.

There was also frequently built next the stage wall a separate elevated stage for gods (*theologeion* or stage of gods).

246. Machinery.

Concerning the machinery arrangements of the theatre, we know that rolls (ekkyklema) were in use, "on which the interior was shown, often the stage wall was opened"; also lifting and supporting machines (aiorema), by which gods and heroes appeared suspended in the air (Aeschylos, Prometheus, etc.); likewise apparatus for thunder and lightning, sinking traps in wooden floors, stairways to the lower rooms, by which ghosts and furies ascended and descended.

247. Time of the Play and the Play.

The play was not given daily, but only on certain festival occasions, then commencing in the early morning in the open air; a later period first required the covered audience room.

Pantomime plays were unsuited for wide and large rooms; hence the actors were made to appear larger than they actually were by the use of various artificial expedients, such as wearing shoes with thick soles (cothurnus), the face-masks with a kind of toupee, by padding the breast and body, and by enlarging the hands by gloves.

Representation in festival play was very simple in the early period. The body was clad in a light apron, the face daubed with lees, the head wound with parsley, and the cheeks covered by leaves, this being the oldest costume; other modes of coloring, masks of linen, bark, or wood, came into use only later.

3/4 Only a single flute-player originally accompanied the chorus, in this accompaniment the flute being subordinate to the singing; the flutists later played solos and lead the singing; the dancing step became dance figures (schemata) by turnings and twistings; "in which the meaning of the song appears more or less clearly to the eye."

A view of the proscenion during the presentation of a Greek comedy is given by a painting in several colors on a black ground on a vase (krater) at Lentini. The front wall of the hyposcenion is ornamented by candelabras and pearl-beads; at the centre is shown a flight of steps leading from the orchestra to the proscenion (Fig. 226).

Rich figure decoration in relief is shown by the front wall

248. Porticos.

4. The porticos. Vitruvius also requires porticos behind the stage, "so that when sudden showers of rain interrupt the play, the people may have a place to which they can withdraw from the theatre", and he cites as such the Stoa of Eumenes in Athens, that was erected between the Theatre of Dionysos and the Odeion of Herodes Atticus, as well as the porticos on both sides of the stage in Tralles, over a stadium in length (600 ft.), and others. (Also see the illustration of the Theatre of Patara, Fig. 224). The width (depth) of these porticos must equal the height of the external columns.

The grounds between the porticos were then indeed decorated by formal gardens, fountains, statues, etc.

The theory transmitted by Vitruvius and by Pollux and generally accepted, that also in the Greek theatre during a certain period, the chorus was in the orchestra, and the actors played on an elevated stage, was first called in question by Höpken on grounds deduced from the drama itself.²⁸⁵ But no one has contested that the oldest greek theatres consisted of but two parts, the place for dancing and the space for the audience, this arrangement never being abandoned from the satyr-plays (saturnalia), and that the logeion was a later addition for the actors. It is likewise not contested that the scene was originally constructed of wood with decorations of cloth, later erected in stone as a permanent decoration.

Note 285. See Höpken. De theatro attico saeculi a Ch. quinti etc. 1834

The results of further researches and studies have now settled, that in the Grecian theatre before the Roman period, there existed no logeion and no elevated stage, and therefore there was no separation between the places of the chorus and of the actors. Concerning this, it is said that Vitruvius drew a correct ground plan according to the lines, but he is erroneously interpreted, for he himself regards the area $v v' w w'$ in Fig. 223 as a raised stage and $v v'$ as its front wall, while $v v'$ is the ornamental wall placed before the stage-building, or the proscenion.

The actors' booths first marked the position of the backgr-

ground of the play; the booths were later concealed by a wall of boards, and this was furnished with a door, through which the actors entered and retired, whereby the booths became the "scene" and their decoration the "proscenion", i.e., that which lies before the booths (tents). From this plan grew the later stone stage-buildings, "a solid structure with a simple facade toward the orchestra, before which was placed the movable decoration."

The movable temporary decoration was followed by the stone proscenion, adorned by columns, which was built before the stage-building (see Lycurgus' Theatre of Dionysos in Athens, 330 B.C., the Theatre of Polycleitos in Epidauros, middle of 4th century B.C., as well as those in Megalopolis, Oropos, and in Assos).

The cothurnus preceded the elevated logeion, "which gave the actors a movable platform beneath the feet, that permitted freedom of movement to them, but already raised them above the chorus surrounding them." The technical investigations at the Theatre of Dionysos in Athens (1886) have meanwhile settled, that a permanent scene-building did not exist previous to the era of Lycurgus.²⁸⁶

Note 286. On the Greek Theatre, see Baumeister, vol. 3, p. 1780 to 1780; also what is herein later stated under 2 and 3 concerning the Theatres in Epidauros and Oropos.

2). Monuments.

249. The Monuments.

Many ancient theatres have been preserved to us in notable remains, and some of the more important will be mentioned.

1. The Theatre of Dionysos in Athens, located on the south slope of the Acropolis was perhaps begun even 500 B.C, but was only completed by the orator Lycurgus during the years after the Battle of Oeronea (338 B.C.). Rebuilt repeatedly, it received a last restoration under the archon Phaeuros in the 3d century A.D.; the scene-building and the orchestra therefore no longer retain their original form.

The concentric passage was reached by the stairways and directly from the road to the Acropolis. The step seats of Poros stone rest partly on the natural earth and partly on masonry foundations, the uppermost being cut in the solid rock. The lowest broader

step bore aornamental seats of Pentelican marble, that are in great part preserved, and were originally 67 in number. The magnificent chair in the centre for the priest of Dionysos is very interesting and beautiful (Fig. 227), as well as the figure-reliefs on the front wall of the hyposcenenion.

The orchestra exceeds the semicircular form in accordance with the rules of Vitruvius, and is separated from the rows of seats by a marble parapet wall 3.61 ft. high, but this was added only during the Roman period. A chancel extending around before this was covered by Poros slabs, and in some places by 322 perforated marble slabs, and was bordered by a parapet wall.

The pavement of the orchestra is laid with marble slabs in different colors with a lozenge pattern in the centre in Pentelican, Hymettic, and reddish marbles, in which geometrical drawings are incised. The remains of the stage-building belong to different periods. The reduced thickness of certain parts of its walls permit the assumption of a wooden stage-building in the period of the 5 th century.

The location of the Theatre was already known early; but the excavations of Strack (March 22, 1862) afforded the first opportunity for completely laying it bare.²⁸⁸ The excavations carried on in 1886 revealed an earlier plan beneath the building of Lycurgus, that permitted the conjecture of an annular place for dancing and allowed the true form of the scene-building of Lycurgus to be recognized. This chiefly consisted of a long rectangular structure with two projections, which included the front wall of the stage-building between them.

2. The Theatre in Epidauros, with its magnificent seats of light sparkling limestone by Polycleitos, was built about the middle of the 4 th century B.C., and is for the greater part well preserved. The interior was long overgrown by bushes and shrubs, but it was cleared in very recent years, the orchestra and scene with the adjacent structured parts were laid bare, so that the Theatre appears as one of the finest of the Grecian period. Following the slope of the mountain, the area for the spectators is built thereon and extends towards the north. The curved line of the lowest row of seats is drawn from three centres; the successive rows of seats are parallel to this, and

therefore are concentric. Up to the first diazoma, these are divided into 12 wedge-shaped sections by 13 narrow flights of steps, while 22 sections between 23 stairways remain in the upper tier (Fig. 228). A wider concentric passage is placed in the interior of the theatre close to the enclosing wall.

Note 288. See Ziller & Julius. Aufnahmen und Beschreibung des Theaters. Zeit.f.Bild. Künste, 1878. p.193, 236. Also Praktika, 1879.

The orchestra is of complete circular form, this shape being fixed by a ring of slabs on the same level with the orchestra. Around one half of this extends a slightly sunken channel with discharge openings, which open into a subterranean sewer (B in Fig. 228). The stage-building consists of a long rectangular structure divided into 5 rooms, before which was later placed a permanent proscenion decorated by Ionic half columns. A narrow hall D was thus inserted between this and the front wall of the ancient stage-building. On both sides, narrow ramp-like passages E led to the stage-building, to the proscenion, or the narrow corridor between proscenion and scene. The proscenion wall has from the sill to the upper angle of the cornice a height of about 12 Grecian feet (= 11.64 ft.). But this is the maximum, which Vitruvius declares permissible for the height of the logeion! Hence an "excessive height" cannot be attributed to this wall, considered as the front wall of the logeion, as it is; but the acting space of the logeion indeed proves to be shallow, if the front wall of the scene-building is assumed to be the rear wall of the logeion.²⁸⁹

Note 289. Also see Praktika, 1884. p.46-48; pls. A, B*.*

3. But at the Theatre in Oropos was found a similar front wall, that has only a height of 8.23 ft (Fig. 229).²⁹⁰ The wall is likewise there adorned by half columns (8 in number and of the Doric order), which are wrought in the same blocks with pilasters, which have at their backs rebates for receiving closing slabs. While the central intercolumniation remains open as a doorway, the others were filled by "pinakes" (panels ?). The height of the wall from the sill to the upper angle of the cornice was 8.23 ft., and is therefore less than at

Epidauros. On the architrave over the colonnade is the inscription:-- (See the original text) by which this wall is designated as the proscenion. The assumption that this was the rear wall behind the actors seems certainly doubtful on account of the small height; but the dimensions of the orchestra also here is only 40.67 ft. to the outer edge of the circle, while it measures 78.672 ft. in Epidauros, and the space for acting was for a logeion only 6.33 ft. wide, if the scene wall was made high. (Fig. 120).²⁹¹

Note 191. Facsimile reproduction from Fraktika, 1886, pl. 3.

324 Moreover according to Vitruvius' rule (Fig. 231), neither in Epidauros nor in Oropos would the depth of the logeion be greater than is the case in both examples in question, if the low wall adorned by columns be regarded as the front wall of the logeion, and the front wall of the scene-building as its rear wall, the superscription in Oropos being considered a subscription. But the small height of somewhat more than 8 Greek feet for the proscenion wall always remains doubtful! It certainly might have been carried higher by woodwork and cloth, so that it may have merely served as the base of a painted landscape decoration above it. Front walls of logeions supported or decorated by columns occur in different paintings on vases.²⁹²

Note 292. A collection of such in Baumeister, vol. 3, pp. 1753, 1754.

4. The theatre in Argos is irregular in form and is cut in the solid bluish-gray limestone rock; 4 "kerkides" are still to be seen, and 50 and 60 seat steps may still be counted upwards.

5. The Theatre in Megalopolis. According to the publications of E. A. Gardner, W. Loring, G. G. Richards, and W. F. Woodhouse²⁹³, 6 steps led up to the substructure of the scene, 5.74 ft. high, these having over 11.4 ins. rise and are not to be regarded as steps for passage without further evidence (Fig. 232). They extended around the front longer side and both ends of the unusually deep (17.88 ft.) scene.

Note 293. Jour. of Hellen. Studies. Vol. 2 (1890), pp. 294-8.

Examining then the ground-plan published by the investigators mentioned, the front wall of the scene is then placed exactly

where Vitruvius requires its rear wall to be. Nevertheless according to an inscription found there, the steps must have been built in the 4th century. Further publications on these English discoveries are in prospect, which cast doubts on the new views of Dörpfeld and Kawerau on the scene of the Greek theatre, for a certain period.

Meanwhile Dörpfeld has settled, that beneath the wall with the doors remain certain earlier foundations, the piers, that apparently must belong to the original structure, so that the wall with its doorways can only have been erected during a rebuilding of the theatre. According to Dörpfeld, the podium before the wall had but two steps, and three others were only added when the orchestra was lowered, these being readily distinguished from each other. A further proof of this is that the seats of honor stand no longer in their original position. The front projection was not a free podium, but rather formed the stylobate of a portico.

The front of the scene therefore was in the Greek period a facade about 26.24 ft. high, adorned by 14 Doric columns, having originally 2 and later 5 steps. That the actors appeared before this colonnade and not on its top is self-evident; it formed the back-ground for the play, "which, if the purpose of the piece exceptionally required it, could be concealed by a decoration or proscenion placed before it." Since the termination of the excavations, an English architect is preparing an accurate plan of the theatre in question, that should make possible a correct decision in the matter. ²⁹⁴

Note 294. See Mitt.d.Kais.Deutschen Arch. Inst. Athen. Abth. Vol. 16. Berlin. 1891. pp.256-9.

6. Of the Theatre in Magnesia on the Meander, excavated by F. Hiller von Gartringen at his own expense, the scene-building, the entrances to the theatre, the greatest part of the orchestra, and a portion of the audience room, are exposed. Three building periods may be recognized therein, an ancient Grecian, a Hellenistic, and a late Roman. The earliest scene-building consists of five rooms lying beside each other, like the later excavated theatre next following.

325. 7. The Theatre in Eretria, with which it has another arrange-

arrangement in common; a subterranean passage from the scene-building to the orchestra, beautifully constructed of ashlar. Dörpfeld desires to recognize in this an arrangement for the sudden appearance and disappearance of an actor in the midst of the orchestra. Humann has drawn an accurate plan of the Theatre in Magnesia.²⁹⁵

Note 295. See Mitt.d.Kais.Deutschen Arch. Inst. Athen. Abt. vol. 16. Berlin. 1891. pp.264-266.

8. For the Grecian Theatre in Piraeus, which accommodated 2000 spectators and had much in arrangement, dimensions, and construction, allied to the Theatre in Eggesta, see the source mentioned below.²⁹⁶

Note 296. Karten von Attika. Pub. by E. Curtius and J. A. Kaupert. Berlin. 1881. pp.66-67. With sketches and explanations by Borrmann in Note 42.

9. The Theatre in Mantinea was built on the plain, and an artificial hill was erected to raise the steps, which was again retained by walls of large polygonal stones. This plan required external flights of steps to the upper rows of seats, as also proved by the excavations. The seats surrounded the orchestra in somewhat more than a maximum semicircle of 109.88 ft. diameter. The seats themselves were partly made of limestone and partly of white marble. The external enclosing line of the theatre had a different centre from the orchestra, which had a diameter of 35.59 ft.

The hyposcension was arranged in an irregular and peculiar way, and it is now settled to have been a limestone wall 2 courses high and 69.11 ft. long. On the front wall next the public were still found the marks of the location of 16 columns, and a gap at the centre for the doorway 4.92 ft. wide connected the orchestra with the space beneath the logeion.²⁹⁷

Note 297. Bull. d. Corres. Hellen. 1890, p.248, pl.17.

The well known and likewise low colonnade was set on the same plane as the orchestra. This was also the case in the Theatre in Epidaurus and in the Sanctuary of Amphiaraus near Oropos.

10. The Theatre in Eggesta. The first range with 20 seat steps was divided into 7 kerkides and is still well preserved, as well as the front wall and a portion of the upper surrounding

wall. It is remarkable that the 20 rows of seats, being here those below the concentric passage, were furnished with backs. The stage-building is still indicated by courses of stones on the substructure. The diameter of the Theatre is 198.64 ft., and the diameter of the orchestra is 54.12 ft.

11. The Theatre in Syracuse, built between 480 and 406 B.C., was divided into 9 kerkides; two concentric passages intersected the audience space; 46 rows of seats are now certain; 15 others are assumed to complete the entire height of the theatre. the diameter of the theatre is 492 ft., and it is counted among the largest of the Grecian world.

12. The Theatre in Catania. Only the foundation walls are of Greek origin; on these rest the ruins of the Roman theatre, now chiefly above ground; it had a diameter of 316.52 ft, two concentric passages and 9 kerkides.

13. The Theatre in Akrai was small, dates from the late Greek period, and had 12 rows of seats and room for about 600 spectators.

14. The Theatre in Tanromenion, cut in the rock in semicircular form, was of Greek origin, but was rebuilt in the period of Roman supremacy. The proscenion is narrow, according to the Grecian custom; under this is a vaulted drain. It is the best preserved after that at Aspendos. The greatest diameter is 357.52 ft., that of the orchestra is 129.23 ft.; the audience space was divided into 9 kerkides.

The theatres in Asia Minor mostly belong to a later period but are better preserved, especially the stage-building, although these were nearly all rebuilt under Roman influence. One of the most remarkable is:--

15. The Theatre in Myra. It was built of white limestone, as beautiful and hard as marble, had 27 rows of seats in the first range and 20 in the second, the scene was decorated by granite columns of the Composite order.

16. The Theatre in Aizani was 183.68 ft. in diameter and it was built of white marble; the first range with 16 seat steps is still well preserved. Along the concentric passage are placed in pairs singular niches in the substructure, the surface of each consisting of a single block of white marble. The walls of the scene-building still remain and are of great blocks of limestone,

faced with marble slabs. (Fig. 225).

326. 17. The Theatre in Oyzikos had a diameter of 328. ft. and it was built of rough masonry with marble facing, on the slope of a hill. Only 2 or 3 marble steps are still in place; the scene building has disappeared.

18. The Theatre in Massos, of the 5th or 4th century B.C., has a diameter of 246 ft. The seat steps are of white marble, are decorated by lions' paws, and almost all are still in place. (Fig. 224).

19. The Theatre in Telmissos is one of the largest in Asia; there is none in Europe so well preserved and in so good a style. With the exception of the scene-building, the interior still remains complete; 28 seat steps are still in place. The date of its erection falls in the period of the last Grecian kings (Fig. 224).

20. The Theatre in Patara originated in the era of Hadrian and was built with the greatest lavishness in material; the scene building is best preserved. It has two ranges of 15 steps each. According to a long Greek inscription found on the east side, its construction is due to Velia, daughter of Q. Titianus, whose father had it built. (See Fig. 223).

21. The Theatre in Antiphellos is still well preserved in its audience space; 26 seat steps are still in place; the stage exists no longer, and it indeed may well have been of wood, since no vestiges of its remains are to be found.

22. The Theatre in Perga likewise belongs to the largest and most beautiful, dating from the era of Trajan or of Hadrian. It was built of gray marble and still has 40 seat steps recessed under like consoles; the facade of the proscenion still exists and is ornamented by 5 great niches, 32.8 and 36.08 ft. high; the columns between these are of red veined breccia.

23. The Theatre in Aspendos, of the era of Lucius Verus or of Marcus Aurelius, built by the Grecian city architect Zeno and dedicated to "the gods of the fatherland and to the imperial house", according to an inscription, is the one best preserved. It has in two ranges 21 and 19 seat steps and is enclosed at top by an arcade of 53 arches (Figs. 233, 234).

327 The vestiges of the roofing over the scene are still visible.

328 The theatre is built of great blocks of breccia, set without

mortar; the jambs and lintels of the doorways and all internal decorations are of white marble. The entire length behind the scene is occupied by a great hall for actors, above which are two galleries; the floors were of wood and no longer exist. At both ends of the hall are two stairways, that led to the roof and to rooms ornamented by paintings, that were perhaps intended for authors and the director.

The ruins of the following Theatres are further notable. In Stratonikeia, Laodiceia, on the island of Kisthene, in Sparta, Megalopolis, on Delos, on Melos, in Sicyon, in Pessinus²⁹⁹, in Thoricos, Alabanda, Gnidos, Tyndaris, Scythopolis, Side, Pergamon, etc.³⁰⁰.

Note 299. On the Theatres in Sillyon, Perge, and Aspendos, see Niemann & Petersen. Städte Pamphyliens und Pisidiens. Vol. 1. Vienna. 1890. pp. 51, 70, 102, 147; pls. 14, 20-27, 29, especially the fine restoration of the stage building of Aspendos by G. Niemann on pl. 27.

Note 300. On the Theatre in Pergamon, see; Dritte vorläufiger Bericht über die Ergebnisse der Ausgrabungen von Pergamon etc. Berlin. 1888. p. 40 et seq. A copious list of the ruins of antique theatres is to be found in Müller, Bühnen-Alterthümer, pp 4-14.

b. Odeions, Stadions, Hippodromes.

Allied to the Theatre, both in purpose as well as in the stepped arrangement and construction of the auditorium, are the Odeion, serving both for use and for the exhibition of public dramas, the Stadium, and the Hippodrome.

1) Odeion.

250. Purpose and Design.

No Odeion, as a permanent structure, appears to date further back than the era of Pericles, at least in Athens. According to Plutarch (Perikles 13), "it had in accordance with its internal arrangement many seats and numerous columns. The roof was steeply inclined and terminated in a single apex. The whole must have been a representation and imitation of the Tent of the Persian Kings. Pericles likewise had supreme control here."

"There comes Zeus with sea-onion head, Pericles
And bears the Odeion high upon his brow."

Kratin. Thrak.

"To earn honor thereby, Pericles now for the first time caused the introduction of a musical contest at the Panathenian (festival), and himself as a chosen judge of the prize, arranged how the different parts should be performed on the flute, by song, or on the lute. And as then, the Odeion also later continued to be the place for musical contests."

It was burned during the war with Mithridates, but was rebuilt again by King Ariobarzanes II (65-52 B.C.); it is now gone from the site without a vestige.

The statements of Plutarch agree with those of Vitruvius concerning the form of the structure; columns of stone, and over it a wooden roof, of the masts and yards of ships from the Persian booty (Book V, Chap.9).

Pausanias (Book 1, 20) confirms the statements of both; "Near the Sanctuary of Dionysos and the Theatre is a building, that must be an imitation of the Tent of Xerxes. But it was built a second time, for the earlier one was burned by Sulla, when he conquered Athens."

329 Although the statements of the purpose of the structure are entirely clear and undoubted, the defective remarks on the form of the building leave great opportunity for the play of the imagination. Yet we find allied designs of a later time preserved, which may supply a representation and data for the restoration of the earlier ones.

Philostratus (Vitae Sophistarum II, 5) states that Herodes Atticus built a "theatre" for the Athenians in honor of Regilla, whose ceiling was made of cedar wood; which was likewise remarkable in sculptured work, i.e., on which wood was excellent carving, a structure, whose like was not to be found elsewhere in the Roman Empire. He also built for the Corinthians the "covered theatre", indeed much inferior to the Athenian, "but⁴⁵⁰ which still was one of the few, elsewhere remarkable."

251. Odeion in Athens.

The structure in Athens (160-170 A.D) remains in its principal parts; indeed the name of Odeion was not always applied to it (but Theatre or covered Theatre, see above); but it must have been used in accordance with the directions of Pericles.

The plan is allied to that of the great Theatre; the aud-

audience space is constructed in steps in semicircular form, divided in sections by narrow stairways and separated by a diazoma. The orchestra was somewhat larger than a semicircle, but contained no altar, according to all writers; the stage, five steps higher than the orchestra, was separated from the audience space by the parodoi and originally had a richly arranged monumental architecture with the usual three doors. Behind the stage wall was further a great vaulted hall, right and left of which rooms and staircases extended through three stories.³⁰¹

Note 301. See restoration by Tuckermann in Baumeister, vol. 3, p. 1745.

The entire building was constructed of massive ashlars; the outer walls with great round-arched openings still remain, as well as the stage and the lower portion of the rows of marble seats, and also the pavement of the orchestra, with its white and pale green marble (cipolline) tiles.

The room could hold about 6000 spectators; covering it with wooden construction for a theatre about 253 ft. diameter must have been difficult, and it was only accomplished by leaving open a part as a skylight, which could itself be covered, so that the clear span was reduced, or vertical supports may have been arranged on the diazoma, as at the Theatre in Pessinus (See Fig. 237) and at Syracuse (vestiges of the columns of the roof on the middle diazoma).

Besides the skylight, when such existed, the interior received light also through a high side light, by a row of round windows in the semicircular external wall.

252. Other Odeions.

The remains of such odeions still remain in Akrai (Sicily) beside the large Theatre, in Apherla (Asia Minor) in the vicinity of the Acropolis, and in Pompeii, as well as elsewhere. The read wall and rows of seats are cut in the rock in Apherla; the orchestra had a diameter of 19.02 ft., around this being only 6 rows of seats upwards. The most important cities must indeed in time have been adorned by such odeions, which were also used in the late period for the sittings of courts and assemblies of the people.

As the largest in all Greece after that in Athens, Pausanias (VII, 20) mentions that in Patara. The former was not specified by him in his description of Athens, but was added in the Book "Achaia", "since Herodes had not then commenced the structure, that surpassed all others in magnitude and beauty".

2). Stadion.

253. Purpose and Design.

The Stadion was the course intended for racing contests, long and narrow, semicircular at one end, rectangular at the other. There were stepped seats for the spectators along the long sides and around the semicircular end, as in the theatres and odeions. The judges of the contest occupied special places between these, opposite to which in Olympia was erected a marble altar of Demeter, from whose steps a priestess of the goddess looked upon the contests (See Pausanias, VI, 20).

The appellation "Stadion" for the race course must have been derived from the most famous one in Olympia, which was exactly a stadion = 600 Greek (Olympian) ft. in length, and indeed served as a model in plan and arrangement for all others.

The rounded portion (sphendone) was not used for races; the course extended only as far as the straight side; projecting antae (sphenes) at the beginning of the sphendone, or shafts of columns set between the parapet walls (Stadion in Athens), marked the end. The starting place was at the square end.

A system of drains was arranged for keeping the course dry, which was covered by thin slabs and earth, and whose vestiges are still preserved in Athens. The course was separated from the spectators by a parapet wall, behind which was placed an entrance, which was 5.97 ft. wide in Athens; the public entered there to pass thence to the seats (Fig. 235). This entrance could also be drained by a masonry drain beneath it, which received and removed the rain water flowing down from the seats. The pavement of the passage was one foot lower than that of the course; the parapet wall rose 5.38 ft. above it and above a foundation wall of the same height; then followed the rows of seats, divided into sections by narrow stairways.

334 For the judges of the contest and the competitors, a sepa-

separate entrance to the course and the seats was arranged. Pausanias (Book VI, 20th) designates this as the so-called covered passage in Olympia, which was likewise rediscovered by the German Expedition. For the same purpose was also the subterranean passage 12.45 ft. wide found at the Athenian stadion, which terminated within the arena of the sphendone.

As for theatres, natural slopes were also mostly chosen as locations for the stadeions, between which the course was excavated, as in Athens, to thus obtain cheaply and conveniently the substructure for the seats; or this latter was formed by simple banks of earth thrown up, as in Olympia, or entirely built of stone masonry, as in Delphi (Pausanias, X, 32), or composed partly of stone masonry, partly of natural earth slopes, as in Messene; marble seats are mentioned in Corinth, Delphi, Athens, etc. Porticos were carried along the upper row of seats in Messene and Aphrodisias; the Stadion in the latter place was semicircular at both ends, a form of plan already belonging to the late period; as well as the course in Laodiceia, which according to an inscription, was later changed into an amphitheatre. As in the theatre, the space for the audience had to accommodate the maximum number of men, while the number of the built rows of seats could nowhere be as great as in the theatre. The Stadion in Perga therefore had only 17 rows of seats, that in Aizani only 10, while Aphrodisias shows 26; Aizani seated 12,760 men, while 50,000 found room in Athens. The dimensions of the still best preserved stadions are not very different, for those of the arena are:--

In Athens	109.4 ft. wide and 671 ft. long.
In Aizani	152.0 ft wide and 725 ft. long.
In Aphrodisias	98.4 ft. wide and 745 ft. long.
In Olympia	105.0 ft. wide and 691 ft. long.
254. Remains.	

Only scanty vestiges remain of the Panathenian Stadion on the left bank of the Ilissos; the slopes, the ruins of the walls, and the cleared pavement of the arena readily permit a restoration of the whole. No more beautiful location for the purpose could have easily been chosen and utilized, than is found here. The end is placed parallel to the course of the river and was

decorated by a portico with columns or a portal, opening towards the great stone quarry lying on the longitudinal axis of the stadion, and afforded access to the public.

The first building was built by the orator Lycurgus (350 B.C.); Herodes Atticus supplied it with seats of Pentelican marble about 500 years later. At the cost of King George of Greece, the ruined portion of the sphendone was merely rebuilt by the German architect Ziller, thereby fixing the exact forms of the plan and of the details.

The most famous of Grecian stadions, that in Olympia, which seated 40,000 to 50,000 men, was uncovered by the German Expedition in 1879-81 in its most important parts. The course proved to be a long rectangle of about 702 by 105 ft., surrounded by sills of Poros stone. Around this rectangle at a distance of 3.28 ft. extended a water channel with several basins, from which fresh water could be taken during the games. The slope of the Kronion hill was utilized for the northern portion of the space for spectators; artificial embankments were necessary for the southern and others. The seats for the public were of woodwork. At each end of the course is a limestone sill, which supported wooden posts at equal distances, separating 20 starting places. The exact distance from one starting point to the other, from centres, is 630.65 ft. The eastern wall terminates the course in rectangular form, not in semicircular form with the sphendone used elsewhere. From the Altis, the Stadion has but a single direct access, near which stood the Altars of Hermes as Protector of the Contest and of the Demon of the favorable moment, to warn the contestants, "that yet all result lay in the hand of deity", and on the right of the passage rose as a warning the bronze statue of "Strafzanes".

Note 303. See *Ausgrabungen*, Bd. IV, p. 50, pl. 38; Bd. V, p. 24, pls. 35, 36; also *Funde*, p. 21, 22.

332 3). Hippodrome.

255. Race-course and Starting-places.

The Hippodrome was the race-course for horses and chariots. Its general arrangement and form was similar to the race-course for foot-races: but length and width had to be greater, in order to have room for placing the row of horses and chariots. 493

Therefore the Hippodrome consisted of the level race-course (dromos), divided along the middle by a simple bank of earth into two halves of unequal length (see Pausanias), terminating at one end in semicircular form, at whose centre stood the goal, about which horses and chariots must turn. At the opposite end was the starting place for the horses (apnesis), which in Olympia had the form of the bow of a vessel, "that extends into the race-course with its prow." Each of these starting-places, in which were built the places for chariots, had a length of 400 ft.; they ended in a portico, the so-called Portico of the Agnaptos. Exactly at the middle of the prow of the vessel stood an altar of sun-dried bricks, on which sat a bronze eagle with outspread wings; before it on the vessel's prow was a bronze dolphin on a balanced beam.

When the signal for starting was given, the eagle was raised on high, so as to be visible to the assembled spectators; the dolphin was lowered to the ground. The rope stretched before the places was now dropped, so that those next the Agnaptos portico fell first; then the charioteers started, "so that those in front on the ship's prow were in line with each other. Thenceforth came the test of their own skill and of the swiftness of their horses." y

A passage terminated at the longer side of the race-course, which was carried beneath the place for spectators (as in the Stadion); on this stood the Taraxippos, the Terror of Horses, in the form of a round altar, which frightened the horses. In Nemea, this, as a red stone, "that shone like fire", formed the turning point of the course.

On one goal stood a bronze statue of Hippodamia with a fillet in her hand. The adjacent conjectural plans (Fig. 236) of the Hippodrome in Olympia by Hirt and Visconti give an approximate idea of the arrangement, but do not entirely correspond to the otherwise not very coherent text of Pausanias.

The plan of the Hippodrome in Pessinus (Fig. 237), with its arrangement of the race-course, the form of the starting-place, and of the spina extending along the middle is of the later period, or of Roman origin. But the connection of the Theatre and Race-course remains interesting, which may have its model

in the long terraces (Pergamon and Aegai) arranged with the Theatre.

256. Space for Spectators.

The space for spectators, composed of step-like rows of seats, as in the Stadion, and similarly divided, also laid on natural slopes or were constructed of earthen embankments (Olympia).

c. Baths, Gymnasions, and Palestras.

257. Baths.

Sea and river baths for invigoration, warm tub baths for cleanliness, were already mentioned by Homer. With increasing luxury, the custom of warm bathing became more widely extended; bath rooms were arranged in the private houses, and "balnearia" were built for the great public, either kept by the state or by private speculators, in which visitors bathed together in great basins, employing sprinklers and basins of all kinds for pouring on the water, etc. Figs. 238, 239, represent these baths after the vase paintings, one for men and the other for women, in which sprinklers and pouring are to be recognized. A partially preserved room in the Athenian Dipylon for washing the feet still affords a vivid representation. Otherwise little has become known of the architectural arrangements of Grecian baths. That in Assos is the only larger Greek bath certain at this time. ³⁰⁵ This shows as the chief apartment a portico about 16.4 ft. wide and 223 ft. long, in which stood the great basin for water, whose bases were found. This was only intended for washing, pouring, and sprinkling, as represented on the vase paintings.

Note 305. According to Koldewey in Mitt. d. Kais. Deutschen Arch. Inst. Athen. Abth., vol. IX, pp. 44, 46. Athens. 1884.

258. Gymnasions and Palestras.

Gymnasiums and Palestras are often of equal importance. Originally and strictly understood, the latter was the place for contests in pugilism and with the rings. The Stadion and Hippodrome being the places intended for the performance of the festival games, so were the gymnasiums places for exercises preparatory thereto; they were included among those public establishments in which Grecian youths received the chief branches of their training, the development of physical strength.

The earliest gymnasiums must be considered as simple places for exercise in the open air, shaded by groves of trees, later enclosed by walls, as Pausanias (VI, 21) describes them at Elis. There in the archaic Gymnasium in the city of Elis, where the athletes performed their exercises before they went to Olympia, was first placed within the walls of the different race-courses, separated from each other by tall plane-trees, one intended for running, the others for competition in the five contests; also the Pletherion, where the judges of the contests paired off together those of equal age or equal skill. Adjoining these longer rooms were built smaller ones; the exercise place for competition with the rings (the *Palestra* proper), which, when skilled in the exercise of the rings, further exercised in fights with the softer thongs on the hands. From its form, this room was termed the "Square". Another place was likewise enclosed by walls and was called "Maltho", from its soft floor; it was opened to the youths during the festival period. Two bronze statues of boys in the form of contestants in the five combats decorated the entrance to the Maltho. Altars of Hercules, of Eros, and of Demeter, were probably set in these places.

⁴⁹⁵In the Gymnasium at Olympia were found places of exercise for the five combats and for running, in their vicinity being a smaller and separate room for men with the rings (*Palestra*), outside of the colonnade along the eastern wall, thus facing west and south, the barracks of the athletes. (Pausanias, VI, 21).

259. *Palestra* in Olympia.

According to the excavations of the German Expedition, the *Palestra* in Olympia was a square Doric court with columns, 134.4 ft. along the side, surrounded by chambers and rooms like porticos, to which two columnar portals (*Prostasis*) led, with two columns-in-antis of the Corinthian order. The court served for exercises and had in its northern part a peculiar pavement of grooved slabs. The columns of the hall were of the Ionic order, so that all three orders occurred in the building.

In the deep rooms toward the north is thought to be recognized the *Ephebeum*, and beside this the *Elaetnesium* and the *Con-*

Conisterium; a room on the east was the "Frigida cavatio", from its basin for bathing. Other rooms for indeterminate purposes were furnished with stone benches.

The Palestra in Pompeii of the Oscan period may be mentioned as another example.

260. Gymnasium in Olympia.

Of the Gymnasium, only one southern portico of the Palestra, the beginning and end of the eastern portico, 690.47 ft. long, were excavated, together with the Propyleion lying between the two, in whose vicinity lie ruins of the Roman Thermae (see plan of the Altis, Fig. 132). This Gymnasium was not an enclosed building like the Palestra, but an extended place loosely surrounded by Doric porticos. The eastern portico was in two aisles, had a length of 688.8 ft., and it is regarded as a roofed stadion, used in bad weather. ³⁰⁶

Note 306. See Ausgrabungen, Vol. V, p.40, pls.38-40; also Funde, I-III.

In one of the Gymnasiums in Elis was also found the council house of the Eleans, called Lalichmeion after the builder. "In the same were given free addresses and literary works of all kinds were read. Shields were hung up around it, though ²⁹⁶ merely for ornament and not for warlike use." A building erected in the Gymnasium at Mantinea (Pausanias, VIII, 9) was far famed for its beautiful stones and contained a hall with statues of Antinous and paintings.

We see in the gymnasiums rooms and arrangements for intellectual and physical development combined together, equally distinguished under a roof and by magnificence. The originally simple enclosed room becomes a richly treated architectural whole by the addition of the porticos mentioned, and by the connection of the Lalichmeion.

Not much more remains of these extensive and magnificent structures of the late period for intellectual instruction and physical exercise; only ruins in Athens, Ephesus, Magnesia, Hierapolis, Alexandria-Troas, etc., still prove their existence, splendor and extent: the two best preserved ruins in Ephesus and Alexandria-Troas correspond nearly to the requirements of Vitruvius, even if they are not shaped after the same model.

336 261. Vitruvius' Plan.

According to Vitruvius, gymnasiums are "not customary in Italy;" therefore he merely gives a programme arranged according to those in Greece, and he accordingly requires colonnades around them, the courts being of square or elongated form; three of these simple, the fourth facing south or opening south, but doubled, so that the rain might not be driven into the interior; also with three colonnades were to be spacious additions (exedrae) with seats for philosophers, speakers, hearers and friends of scientific efforts; with the doubled portico in the middle was to be the hall for youth (ephebeion), a very spacious addition furnished with seats and about one-third longer than broad; on the right of this, the sack-fighting hall (kor-kyreion), where the sack of sand hanging from the ceiling was struck; beside it being the dusting room (conisteræion), where the ring-fighters sprinkled themselves with dust after the anointing; then in the corner of the cold bath (lutron); but on the left of the ephebeion the unguent room (elatheseion), and a fresh bath adjoining this, opposite to which is the vaulted sweat bath (twice as long as broad) with its heating chamber; also a Laconic hall and opposite this the warm bath.

Externally (adjoining the rear of the complex building were described, according to Reber), Vitruvius requires three porticos, that contain places for contests; one, the northern, doubled like the southern and to be of considerable width; the two others single, so that they should have along both sides next the wall and the columns, raised footways, the central space being lower, so that the clothed spectators might find place on these footways and not be inconvenienced by the oiled contestants. The athletes could also exercise here in covered rooms during winter. Such a portico was termed a Xystos. This and the double portico were surrounded by shrubbery and promenades, adjoining these being a greater stadion with space for spectators.

337 Therefore the Vitruvian structure consisted of two adjacent portions; what was required in the first can nearly be provided in the Ephesian plan; combine therewith the Vitruvian northern and the so-called double portico with that required on the

on the south, omitting from the latter the xystus, the promenades and the stadion, then will the second portion by Vitruvius be likewise completely included within the limits of the walls (Fig. 240).

The ground plan of that in Alexandria-Troas, drawn and restored by Texier (Fig. 241), exhibits simpler arrangements than Vitruvius requires and these were carried out in Ephesus. The porticos on three sides, the plan of the ephebeion, of two places for ring-fights, although different in form and size, are both similar and permit recognition of a certain allied form.

The Baths in Assos have suggested the idea, that the two types of gymnasiums of Alexandria-Troas and of Ephesus were likewise baths. The plan of the former has been published by Koldewey, from new measurements, and it is given in Fig. 242 for comparison with the plan of Texier, formerly accepted as correct. ³⁰⁷

Note 307. In Mitt.d.Kais.Deutschen Arch. Inst. Athen. Abth. p. 45. Athens. 1884.

Since unguent rooms occur in the plans of gymnasiums, also cold baths, undressing rooms, etc., and washing basins were also placed in one of the large corridors, so that nearly all rooms required in baths likewise existed here, it would not be difficult to take one for the other, especially since data for ³⁰⁸ the arrangement of both is still so limited. Still the arrangements at Assos and Alexandria-Troas do not entirely coincide, and it is therefore believed that in the latter place other methods of bathing occurred, which were indeed somewhat more complex, but had not reached the full refinement of the Roman imperial Baths.

Note 308. Koldewey. p. 46.

The former Gymnasiums in Ephesus and Alexandria-Troas are therefore to be considered as Baths and as intermediate between Assos and the Roman imperial Bath. This indeed seems the more credible, since a difference is scarcely to be found between the Gymnasium and the Bath, and the belief further prevails, that we must see in the imperial Bath an amalgamation of the native Italian Baths with the arrangement of the Gymnasium Palestra or the Gymnasium.

262. Extension.

No Grecian city can be conceived without a Gymnasium; larger cities indeed possessed several. With the progressive and general development of the physical exercises and the customs of the men, to take part in the games of the youths and spend therein a portion of their free time, they became a need of Grecian life.

d. Market-places, Stoas, Prytaneums, and Hierches.

1). Agora and Stoa.

263. Agora.

For the earnest business assembly of the men, served the Market or Agora. This was originally no arbitrarily chosen place in the city, but was the natural centre of the locality, "a conveniently placed depression in which different ways met." Such a market-place might under some circumstances become the nucleus of a growing district,³⁰⁹ as may be observed in all modern settlements. From the scattered farms and farmsteads, men came together for purchase and exchange on a neutral ground; thus arise those stores of goods, places for refreshment, inns, shops, etc. Goods and men required protection from the weather, wind and sun; the portable, simple tents and booths became fixed huts and houses, the first era of a permanent city community. The originally scarcely fenced, leveled, and perhaps paved place, for whose consecration sanctuaries were provided, is gradually surrounded by business houses, porticos, and administrative buildings, and is adorned by monuments.

Note 309. See Curtius, E. Ueber Märkte hellenische Städte. Arch. Zeit. 1848.

The Greeks arranged their market-places in square form with spacious and double porticos; they decorated these by closely set columns and stone or marble beams and placed passages above the ceilings, writes Vitruvius (Book V, 1-1), and Pausanias says likewise concerning the Market in Elis, that it consisted of not combined, but of porticos intersected by streets, the southern being built in the Doric style and divided in three parts by colonnades. One of the Market-halls in Megalopolis was the "Myriopolis", another was called "Aristandreion" after its builder, and a third the "Philippic", adjoining which was a

third the "Philippic", adjoining which was a fourth and smaller one, in which were arranged six rooms for administrative purposes. In the midst of the Market was a walled sacred precinct, before which stood a bronze statue of Apollo 12 ft. high. In Argos, the Sanctuary of Athena Salpinx, a structure of white marble, was placed on the middle of the Market; the middle in Pharae was decorated by the stone statue of a bearded Hermes; in Antikyra was ⁵⁰¹ a Fountain-house supported by columns. The Eleans also rode horses in their Market-place.

With increasing assemblage of people in large cities, one of the original purposes of the Market was given up and a special place was chosen for the treatment and discussion of public occasions. (compare Athens and Megalopolis, where there was a special Council Hall, the Thersilion, that accommodated 10,000 Arcadians in an assembly.

Everywhere that a democratic state freely developed, the market-place became the scene of great activity in art. To the porticos were added aqueducts, groves of trees, as well as exhibits of art works. In cities of later origin, the earlier accidental and irregular plan of the Market-place was abandoned and this was made a part of the plan of the city in accordance with a definite scheme.

According to Pausanias (Book VI, 24), it appears to have been the Ionians, who introduced the improvement; "the Market-place in Elis is not arranged according to the same plan, as the Market-places in Ionia and the neighboring Greek cities, but in the older style."

The remains of Ionic Market-places exhibit a rectangular or square arena surrounded by porticos. Nothing longer remains of Market-places in the Grecian mother-country; in Syracuse, an unfluted column in a cultivated field marks the Agora, once so magnificent; more data are afforded by some cities in the islands and the cities of Asia Minor.

The Market-place in Aegae still appears as an extensive asellar structure of three stories, 270.17 ft. long and 37.5 ft. wide, and with a transverse wing 88.56 ft. long. Two of the stories lay beneath the pavement of the terrace on which the building stood, while the third stood thereon as an isolated

structure. One longitudinal wall and transverse walls at distances of 14.1 ft. subdivided the lower stories into small and nearly square rooms with doors and windows, above which was placed the two-aisled portico, opening in front.³¹⁰ The comparison of this Market-place with that in Pergamon exhibits a striking concurrence of the two. A third quite similar and tolerably well preserved design³¹¹ of this kind at Demirdji-Deressi in Caria is published by Le Bas.³¹² Fabricius gives further conclusions in regard to the latter, which is usually designated as appertaining to the antique Alinda. In Aphrodisias stood four double porticos, which were internally decorated by columns of the Ionic order, 460 in number; marble seats invited one to rest.

Note 310. Compare Bohn & Schuchardt, p.15-27, Figs. 13-26.

Note 311. In Voyage Archæologique etc. Vol. 2. Architecture. Pls. 4, 5. Paris. 1848.

Note 312. In Bohn & Schuchardt. p.27-30.

The City Market-place and State Market-place in Pergamon lay on terraces surrounded by porticos, connected together by ramps and flights of steps.

264. Stoa.

Besides the porticos belonging to the market-places or to the theatres, others likewise occur, that have only the purpose of furnishing the people with covered and shady promenades, public walks for decorating streets or squares, also employed for consultations, addresses or readings, the Stoa, which was generally raised a few steps above the pavement of the street.

The oldest were of no great depth, enclosed on one side by a wall, with the colonnade toward the street, above which extended the horizontal entablature, like the described stoas of the temple, furnished with a stone or wooden ceiling, which was again protected by a shed roof.

Thus the Corcyrian portico in Elis had two colonnades, one of which was turned toward the market-place, but the other was turned away from it. "In the midst between both columns do not extend (which was generally the case), but a wall, to there support the ridge of the roof." It was also covered by the gable

roof of the temple. (Compare Pausanias, VI, 24).

The Portico in Thoricos corresponded to what Pausanias held to be usual, so that this should be considered as a Stoa.

The southern Portico of the Hellanodices on the Market-place at Elis was divided in three parts by (two) colonnades; in Piraeus was a Portico with five colonnades; the Stoa of Attalos in Athens had along the rear wall a large number of small rooms for shops or money-changers, just as at the Agora in Antiphellos (compare Adler and Texier). The Stoa of Attalos was in two stories, according to Vitruvius' statements, the lower with Doric, the upper with Ionic colonnades. From the inscription on the architrave, it was founded by Attalos II of Pergamon (159-138 B.C.), and it formed a very long structure 367.36 ft. long and 63.96 ft. wide. A colonnade divided the lower story of the Portico into two aisles, while the upper was constructed in a single aisle. The lower Portico opened on the side of the Market-place and 45 Doric columns supported the upper story, while the roof rested on 22 unfluted columns decorated by bell capitals.³¹⁸ The height of the ancient balustrade north of the Stoa of Attalos is at least 19.68 ft. lower than the stylobate of this portico; the northern wall of the latter was therefore built as a high retaining wall and was always visible. Stairways must have led up to the high raised place before the Portico.³¹⁴ Pausanias also mentions such stoas in Piraeus and two porticos before the Gates in Athens extending to the Ceramicos; also in the Ceramicos itself, the Royal Portico, "where the king sat in judgement, i.e., one of the archons, who for a year was clothed with the office, which was termed kingly." For this, Lange³¹⁶ has attempted to make the form of the basilica credible, this being a three-aisled plan with raised central aisle. In reference to the Stoa in Epidauros, see the sources mentioned below,³¹⁷ and concerning the Portico in Pergamon, see the work cited below.³¹⁸

Note. 318. Compare *Zeit. f. Bauw.* 1882. pls. 52, 53, also Fig. 248.

Note 314. Compare *Mitt. d. Kais. Deutsch. Arch. Inst. Athen.* Abth. Vol. 16, p. 252. Athens. 1891.

Note 316. In *Haus u. Halle, etc.* p. 66-104. Leipzig 1885.

Note 317. *Fraktika.* 1885. pls. 1, 3.

Note 318. *Altertümer von Pergamon, etc. Vol. II, p.40.*
Berlin. 1885.

Before the Portico frequently stood bronze statues of famous men and women (compare Athens); the walls in the interior were in some cases decorated by historical paintings; such a Stoa on the Athenian Market-place with such pictures was called the "gayly colored" (poikile).

One of the finest may have been that in Sparta known by the name of "Persian Portico", "which was built with Median booty, and in course of time was enlarged and beautified; on its columns stood Persians in white marble, among them the Statue of Mardonius.

The length of these porticos was usually great, as shown by the substructure of the Stoa of Eumenes between the Theatre of Dionysos and the Odeion on the southern slope of the Acropolis in Athens. The latter was over 328 ft. long; the former had length almost twice as great.

By the excavations of the Archaeological Society in Athens in 1877, the Portico was proved to be 534.64 ft. long in two aisles and 52.48 ft. in width. A large portion of the limestone foundations of the external longer side are preserved, also the square limestone bases of the inner row of pillars and portions of the rear and side walls, around which extended below a base slab of Hymettos marble.

Note 319. Compare Köhler & Zitter. *Mitt.d.Kais.Deutschen Arch Inst. Athen. Abth. Vol. 3, p.147, pl.7. Athens. 1877.*

In two aisles and partially in two stories is also the Portico mentioned in Epidauros, in which the free pillars in the ground story have octagonal sections with echinus-like projecting capitals to receive pillars and entablature (compare Fig. 70).

Did not these mostly Doric porticos with their long horizontal entablatures and cornices require those curves for deceiving the eye, or even in a greater degree than on the usually small temples? It is unfortunate that nothing is known concerning this, that for these structures not even the scamilli impares were recommended; to employ them would certainly be as well as on the Parthenon and theseion, since the structural

execution of the building was probably here much less careful.

2). Buleuterion and Prytaneion.

265. Buleuterion and Prytaneion.

Data for the form of the council and official buildings serving the state administration (Bouleuterion and Prytaneion) have been obtained by the excavations in Olympia. Vitruvius devotes but few words to the Council-house (Curia); he does not discriminate between Grecian and Roman; he merely says that it should be built in entire accordance with the dignity of the city or of the free state, and he gives some advice on the acoustics of the hall for speaking.

343. The Buleuterion in Olympia consisted of two oblong halls separated in two aisles by a colonnade in the centre and ending in semicircular form toward the west. These two wings on the north and south joined a square central structure and a common vestibule of the Ionic order. Each wing rests on a crepidoma in two steps, and their ends open with 8 Doric columns between antae, whose interspaces had grilles. Separate doorways led from the aisles to the apse divided in two halves. The internal columns supporting the structure of the roof were not fluted.

On the south wing, the regulas and mutules remained without drops, and the entablatures were colored in the usual manner (triglyphs blue, mutules blue, metopes red). On the northern building the drops are entirely wanting on the mutules, while they have an elongated form on the regulas, are made of marly limestone and inserted; only 5 drops were suspended.

In the central building, in which the Agonistes and their followers, as well as the Hellanodices, had to take the oath prescribed for them, indeed stood the Statue of "Zeus Horcheios", and this space was therefore uncovered.

The apsidal apartments are explained as treasuries, in which were kept the state funds, which were needed for the administration of the place and the festival. ³²⁰

Note 320. Compare Ausgrabungen. Vol. 40. pls. 35, 36; Vol. 5, p. 32.

Pausanias takes pleasure in mentioning them in this or that place (compare Elis, Sparta, Athens, etc.). He relates that the Council Hall in Sparta stood beside other magistracy build-

buildings on the Market-place, and that the Gerusia or Council of the Elders met therein, while he only states in the description of Athens, that near the Council Hall of the Five Hundred (citizens chosen by lot), where each 50 men for 35 or 36 days had charge of public affairs and formed the preliminary court of the public assembly), was the so-called 'round Building, in which the Prytanes offered sacrifice. Concerning the Council Hall in Elis, the passages relating thereto have been given in connection with the Gymnasium (Art. 260) and in those in regard to that in Megalopolis, with the Market-place. (Art. 263).

Pausanias states in regard to the Prytaneion, that in Olympia, it was placed within the Altis, that before its doorway stood an altar of Artemis, and in its internal apartment was a hearth, on which the fire burned continually day and night.

The Prytaneion in Olympia appears in the excavations as a spacious rectangular structure, much subdivided by masonry of different periods.

The Prytaneion was originally in each Greek city the House of the Prytanes, the chief officials, in which was the Sanctuary of Hestia, the Sacred Hearth of the State. From thence, the colonists carried the sacred fire with them to the new settlements, as a symbol of continual union. In Athens, north of the Acropolis, was for a time the seat of the government, the Laws of Solon were written in it, and Statues of Eirene (goddess of peace) and of Hestia (compare Pausanias, I, 18) were placed therein.

Here likewise occurred the public meals of the Prytanes and the distinguished citizens during their lives, in which envoys and guests of the state also participated.

347 3). Lesches.

266. Lesches.

Public buildings for the purpose of pleasant society, where neither food nor drink was supplied (like those still in the South, for example in Sicily, but only in the form of large rooms) were usual, and these were the Lesches or Conversation Halls. We may conceive them to have been built like courts or porticos, rich in architectural interiors, since the greatest artists did not disdain to adorn their interiors by paintings,



as Polygnotos did in Delphi. Pausanias devotes seven sections (25-32) of his tenth Book to the description of these paintings, evidence of the importance and prominence in which he held them. Concerning the building, he merely says, that it was founded by the Onidians and was named "Lesche" by the Delphians, since men assembled here in old times to entertain themselves with grave matters as well as with common affairs.

That there were many such places of assembly in Greece is to be seen in Homer, where Melanthe scolds Odysseus:-

"That not to sleep, thou goest into the smoky dwelling of the smith,

Or to the public house and there pratest of many things."

Such a Lesche in Sparta was called "gayly colored" on account of the paintings, the same appellation as for the painted Stoa(compare Art. 264).

Chapter 6. Houses and Tombs.

a. City House of Historic Period.

267. Development.

Just as architecture developed harmoniously and nobly during the best period in temples and state buildings, so did it take little part in the development and extension of the City House. The less interest was devoted to the latter, since the entire thought and custom of the rich and free citizens culminated in the most complete participation in public life. Political activity occupied all men, and thus no especial worth was attached to the home; it had merely to satisfy the needs of a household; most only spent time in their own houses for eating and sleeping.

While the dwelling of the prosperous, of the political leader, and of the ruler of the people, was simple, and in most cases the democratic spirit permitted no prominence of the individual in this respect, the house of the artizan and of the poor was reduced to a very small measure of architectural treatment. The streets were small and dirty, and men might even be run over by herds of swine in the side alleys of Athens, or these might be utilized after the manner of Blepyros in Aristophanes, and they were so narrow, that Hipparchos had to

lay a tax on the overhanging stories and the doors, that open outward toward the street; thus the houses standing on them indeed also corresponded to these conditions.

345 The excavation of a small portion of the new city near the Dipylon in Athens shows us a group of small and very poor houses, placed without order and without reference to the course of a street, built of ordinary stones with earth or mortar. Less thrown together, stood the houses on the rock of Aeropagus, whose plans may still be seen by the leveling cut in the rock (Fig. 245). Neither these nor the later excavations in Megara permit a characteristic or typical form of ground plan to be recognized.³²¹

Note 321. *Comp. Ephemeris Arch.* p. 22-56; pls. 4, 5, 6. Athens 1890.

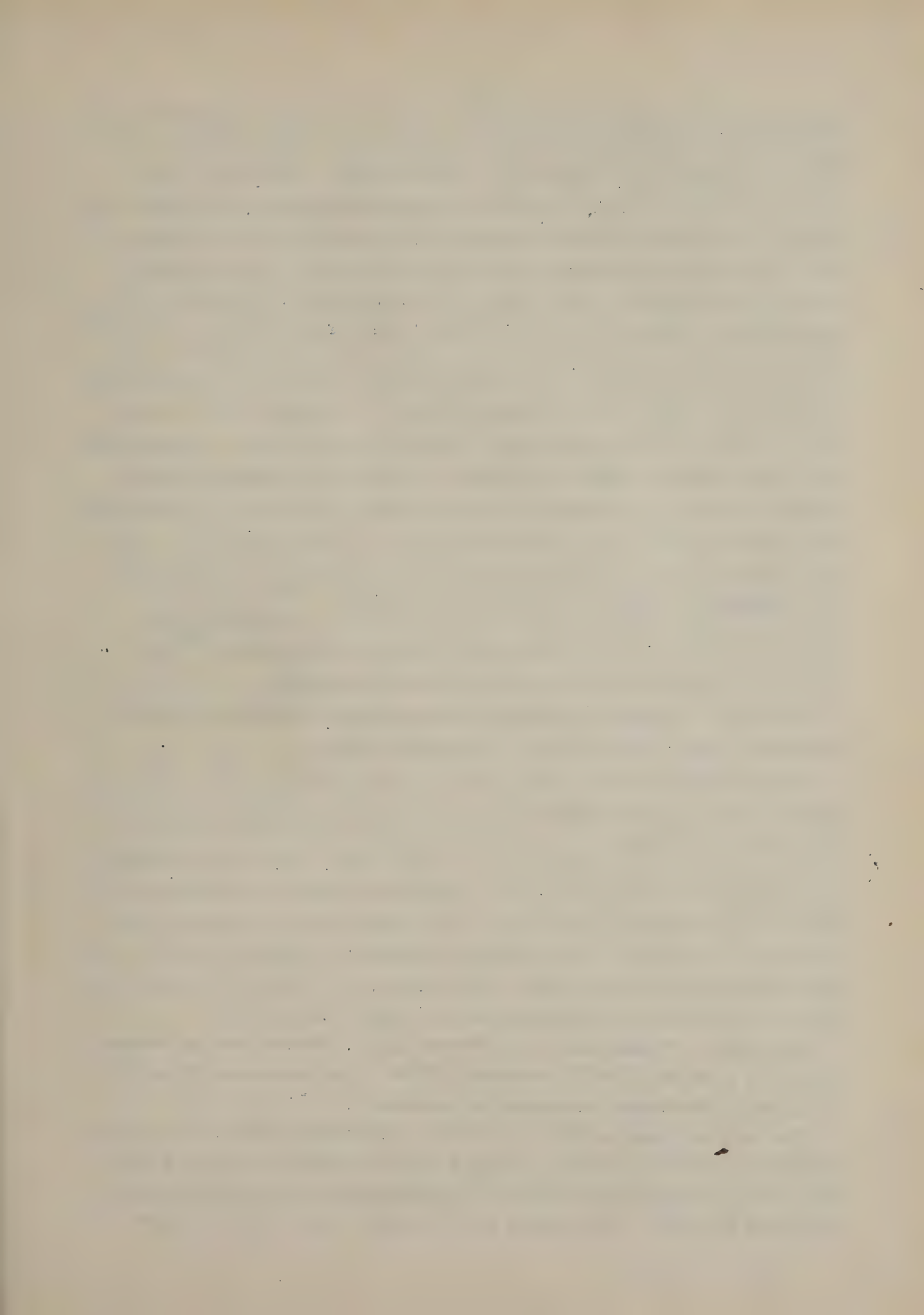
Likewise the plans of "two Houses" uncovered in Piraeus beneath the ruins of the quarter of the city on the east side of the Akte, which Fig. 246 represents, admit of finding no fixed scheme of the plan of a house. The principal facade is on the western side, where a longer street leads, which is intersected by two parallel streets, whose width is 18.04 ft.³²² The walls are chiefly built two-faced and filled with spalls, and they were also externally plastered, the last coat being uniformly colored, sometimes red and veined. Thresholds do not exist or remain. The floor consists of tramped earth with small pebbles inlaid, which frequently form patterns.³²³ In the northern house, a narrow passage leads directly into the court, around which 346 are grouped the rooms. The cippus shown seems to have supported a small sanctuary, and a small garden may have been placed on the terrace.³²⁴

Note 322. On the use of wooden courses in a wall, see notice by Dumont in *Revue Arch.* 1867. II. p. 227.

347 Note 323. On plans of houses, see Koldewey, *R. Neandria*, etc. Berlin. 1891.

Note 324. See *Maps of Attica*, edited by E. Curtius and J. A. Kaupert. *Explanatory Text.* Hef. 1, p. 56, Fig. 7 (from A. Milchhofer). Berlin. 1881.

Concerning the peculiar plan of the House about 400 B.C., a



passage of Xenophon's *Oikonomikos* (Art of Housekeeping) affords some data: "(The House) is not adorned with decorations of all sorts (poikilemata, paintings, embroiderys, carvings, etc.); but the rooms are built with forethought therefor, so that they might be apartments most suitable for what is to be in them, and that they may themselves invite propriety. The sleeping room in particular, placed with due retirement, requires the most costly ornaments and furniture; the dry rooms of the house for the grain, the cold rooms for wine, the open ones for all those labors and furniture needing light. The rooms for the men to be so arranged as to afford coolness in summer, but to be warm in winter. In the general design of the house, to see that its open side be toward the south, whereby in winter it will enjoy the sun, in summer the shade (since according to Socrates, *Memorabilia*, III, 8, 9, in houses turned toward the south, the sun shines into the porticos, while in summer it passes over the projecting roof). The women's apartment to be separated from the men's apartment by door and bolt, so that nothing may be taken out of the interior, unless authorized." ³²⁵ The architect cannot obtain much from this material!

Note 325. Compare Xenophon's Oekonomikos, translated by F. Zeising. Chap. IX, p.48-49. Stuttgart. 1866.

The evil conditions described for the entrance gave place to better in time, and according to Aristotle's *Essay on the Commonwealth of Athens* ³²⁶, there were as a result five police masters in the city of Athens to take care, that the scavenger contractors should not deposit garbage within a distance of 10 (?) stadia from the city wall, that none should build on the streets, or project high buildings over the street line, or carry high water-spouts toward the street, or should have the leaves of the door of his house open toward the street.

Note 326. Translated into German by G. Kaibel and A. Kießling; 2 d edit. p.83, Strasburg. 1891. (The distance from the city wall is indeed incorrectly assumed).

The excavations on Delos in July and August, 1888, led to the discovery of the plan of a house of the epoch of the 2 d century B.C., which Pierre Paris ³²⁷ published, and which we reproduce in Fig. 247. The house had a single exit to the street and

also no vestiges of windows; for the latter always form the exception and not the rule. The rooms obtained light through the doorways from the court, whose pavement was laid in mosaic of pieces of blue and white marble, and it contained a cistern. Paris is inclined to assume the house to have been in two stories, and he extends the peristyle into the upper story, induced to do this by the great mass of ruins of the building.

Note 327. In Bull. de Corr. Hellen. 1884. p.473-496, pl.21.

Note 328. Concerning a House on Delos, also see Greece, a Handbook for travelers, by K. Badeker. Leipzig. 1888. p.147-8. (Later edition published in English).

Ross³²⁹ expresses himself very clearly in respect to the House on Delos as follows; ---"Still worse, since more easily destroyed, is it with the private houses, of which an entire quarter of the city would still be standing, were it not for such barbarism. Their walls usually now remain for a height of two or three "shoes"; the upper portion is broken; the best stones, especially the angle stones, have been removed, and the others with the loose material form great heaps of rubbish, that cover the ruins. Beneath this rubbish are indeed concealed many mosaic floors, and a complete plan might still be made of many ancient houses. ---The material of these dwellings is small stones of the local slate and granite, joined with mortar, the walls are internally lined with pieces of marble (Stucco marble?), almost as hard as stone, on which may be recognized occasional vestiges of color. In many houses are found, and partly still erect, granite columns of one to two "shoes" diameter, which have escaped the rage for destruction by their greater hardness, or by the insignificance of their material. They chiefly stand in squares of eight or twelve, and apparently formed porticos surrounding the inner courts of the houses.----- Beneath many houses, and perhaps under most, were arranged cisterns, partly covered by narrow arches, partly merely covered merely by long granite slabs, on which rested the pavement."

Note 329. In Ross, L. Reisen auf den Griechischen Inseln des Aegäischen Meeres. Vol. 1. p.30 et seq. Appendix to Third Letter:-- Reisen und Alterthümer auf Delos und Rhénia. Stuttgart and Tübingen. 1840.

The plan from Delos exhibits a richer architectural design of a Grecian private house, and such or a similar one was the basis indeed of the complaint of Demosthenes, that the private dwellings had become so large and the public buildings so small, while the reverse was formerly true.

The contrast between the modest ancient and the later pretentious architectural styles was afterwards emphasized by Hadrian likewise, by his inscription on the arched Gateway near the Olympeion in Athens built by him, where with a certain self-consciousness, he contrasted the new city with the homely ancient one.

The central point of the later house plan was found in the court, on which the rooms opened, receiving from it light and air.

268. Plan.

Vitruvius (VI, 7) places in these or in the Grecian house near the entrance doorway a passage of moderate width, on one side of which lay the stable for the horses, and on the other were the rooms for the door-keeper, and which could be closed by a second doorway at the end. This space between the two doorways was termed *dyroreion*. Then followed the entrance to the court, with colonnades on three sides; on the side toward the south, the wall opened between two *antae* set far apart, and this room, the *prostas* or *parastas* was made about one-third less in depth than width.

348 Thence inward were arranged large halls in which the housewife sat with the wool-spinners. On the right and left of the *prostadium* were placed the sleeping rooms, one of which was called the *Tnalamos*, the other the *Amphithalamos*. But on both sides of the porticos were arranged the dining room, sleeping rooms, and servants' rooms. This portion of the building was then termed the Women's Dwelling, (*gynaikonitis*). With this a spacious dwelling was then connected, with wide columnar courts, whose four colonnades were either of equal height, or that toward the south had higher columns. Such a court with three porticos of equal height and a higher one was termed "*Rnodian*". Next the portico towards the north lay rooms for eating and for paintings, or that next the east being the library, that next the

west being a conversation room, but a square hall next the south, which should be so large, that four dining tables could be set therein, still leaving space for service and plays. The men's banquets were held here; therefore this portion was called the Men's Dwelling (andronitis). On the right and left of it were placed small dwellings with separate entrance doorways with moderate dining rooms and sleeping rooms for guests, so that these found lodging in separate apartments and not in the columnar courts. The two columnar courts were connected at the middle by passages (metaulos and mesaulos).

Vitruvius also places the andronitis in the rear and the gynaikonitis in the front peristyle, opposed to the other tradition. A defective text indeed occurs here; that any time existed is improbable, when ^{the} two principal parts of the house interchanged places, and it is not to be harmonized with what is elsewhere stated in regard to the place of the women in the house.

349 Becker's conjectural plan in Fig. 248 therefore corrects the errors of Vitruvius (Fig. 248 after the text of Winkler might also have originally been improved) and may serve to make clear what is said.

The great house must here be satisfied with a single entrance doorway, as in Pompeii; no portal adorned with columns gave admission, as earlier assumed for a house on Delos; this widely accepted assumption has been proved erroneous by later researches.

Note 330. See *Paris in Bull. de Corr. Hellen.* 1884. p.474; also Tarbell, F. B. *The House at Delos. Class. Rev.* Vol. 3. p. 130, 131. March. 1891.

269. Internal Decoration.

Hence if the exterior of the house appears simple and plain, on the contrary, the interior was arranged with much skill and great picturesque effect; an agreeable luxury developed and architecture again produced very splendid and original things.

The courts with their porticos adorned by columns, richly decorated walls of the entrance, the surfaces of the walls of the reception and living rooms, covered with white stucco finish and painting, the panels of the ceilings with their carving

(Vitruvius, VI, 7), the doorways hung with heavy stuffs, and the floors covered by rich carpets, the elegant furniture, flowers, and netted articles, the sparkling water, splashing the the bright sunshine, the deep blue sky over the open courts, the magnificent effects of lighting, the light and shade, the attractive views and beautiful perspectives from all points, all harmonize to heighten the conception of a splendid and yet comfortable dwelling.

No hollow magnificence of facade with plain interior, as so common today, those lies overloaded with columns and caryatids, those boxes for rent, externally representing palaces, meet us here, nor in the late period; men built not for show-loving street passers, but for themselves, their families and their guests. Hence the charm appertaining to the antique house may never be stripped away, and for this reason, its chief points and attractions will recur more and more in the house architecture of all civilized races, and will also outlast us.

To avoid repetition, a thorough treatment of the late Greek house is here omitted, such as is usually attempted on the basis of the well preserved and allied Pompeian House. ³⁸¹

Note 381. For this, see the succeeding volume of this Handbuch, p.273-291. (1st edition).

270. Connection with the Street.

The ancient Grecian dwelling of the family was not directly connected with the street, like the low rented dwelling, a separate type of which did not exist, and which could scarcely have had any claim on architectural criticism, just as little as the great multitude of the ordinary sheltering buildings of our own time.

271. Construction.

Concerning the construction and arrangement of the house, relatively but little direct information can be given with certainty. Neither the existing structural remains nor the ancient writers afford satisfactory data in this respect.

272. Cellar.

Cellars beneath the family dwellings are everywhere proved. If the house were built on a rocky site, excavations in the rock frequently occurred instead of cellars (like such in the

vicinity of modern Athens and of Piraeus, also frequently to be found in Sicily) for storing provisions.

270. 273. External Walls.

The external walls of sundried bricks or natural stone received internally and externally a coating, which usually consisted of ordinary lime plaster; the increasing magnificence of the late period alone commenced to decorate the walls both inside and outside with paintings. Of the otherwise plain and simple House of Phocion (Plutarch, 18), it is said, that it was adorned by bronze plates (sheets); we should imagine this decoration of the House of the Commander to perhaps be similar to that on the Council Hall in Elis, where bronze shields were suspended "for ornament." (See Pausanias).

274. Doors and Windows.

The doorways (principal entrance doors) were closed by leaves of woodwork, that might be covered by bronze plates; they turned on pivots, whose sockets or marks still appear on many thresholds and lintels. The fastening was by an inner transverse bar placed by the porter and raised or even lowered from the exterior by a kind of key. The doorways in the interior were frequently hung with fabrics, as still usual in the south.

Windows are authenticated by representations on vase paintings and other works of antique art, where women looking out of the windows occasionally occur; hence they were not uncommon, but were chiefly arranged in the upper stories only, as in the houses for rent. They were closed by wooden shutters or by fabrics (Fig. 249).

275. Ceilings and Roofs.

The ceilings of the rooms were plainly made with wooden beams or were decorated by carving, color, and paneling. The roofs (simple gable roofs) were constructed of hewn timbers and covered by clay-and-straw, curved or flat tiles.

A useful attic room could scarcely be found on account of the slight inclination of the roof surfaces; in many cases, the framework of the roof alone formed the ceiling of the upper story.

276. Chimneys.

Chimneys (smoke flues) were only in kitchens; the rooms were

warmed in cool weather by charcoal braziers or by portable stoves (*andrachia*, *pyraunoi*, *chaminoi*), as is still the case in the South.

Note 332. Compare *Jahr.d.Kais.Deutschen Arch. Inst. Vol. V. p. 118. Berlin. 1890.*

277. Privies.

Fixed privies must have only been first found in the late period. Quotations from Aristophanes, Demosthenes, etc., which are indeed elsewhere brought forward for their early occurrence, are uncertain and not to be used; the earliest is to be esteemed a passage of Eubulos (4th century B.C.) in Athenaeus (p.417), where it is said, that the Thebans at least had places, that were near and arranged conveniently for certain purposes. The trustworthy Herodotus tells us of his time (Book II, 35): ---

35/ "Thus nearly all customs and uses of the Egyptians are opposed to those of other men; --- They satisfy the demands of nature in the houses; but they take their food in the streets and say concerning this, that one should do in privacy, what may be unseemly though necessary, but in public, what may not be unsightly."

278. Floors.

The floor is to be understood as being of stone, mosaic, or slabs, covered by skins or rugs during the cooler season of the year.

279. Furniture and Utensils.

Although we must conceive the dwelling of the best period as being simple and plain in its exterior and construction, yet its furnishing and utensils must be imagined as progressively treated with the refined sense of beauty, "which has been called the inheritance of the entire Grecian race."

On vase paintings of the entire early period, we find artistically perfected and treated furniture; tables, chairs, and beds. Tables were only used at meals, there were no work tables in our sense; writing, for example, was done on the knee. Wardrobes were not usual in housekeeping; in chests or portable boxes were placed linen articles and clothing materials, and in small caskets were ornaments of gold and silver, ivory and precious stones. Many things were also kept in great

vessels of clay.

280. Vessels.

Vessels were made of wood, of burned clay, and of metal; in their treatment and execution appeared the extraordinary artistic gifts of their makers in a high degree, as shown by the many remaining cups, drinking cups, shallow drinking goblets, lamps, candelabra, mixing vases, unguent vases, and the metal mirrors of such great artistic importance.

281. Inns.

Hotels in the modern sense were unknown to classic antiquity. The enjoyments of the table and the communion in the cups were limited to the circle of friends in the house.

Public inns are mentioned in trading places and harbors, in festival and pilgrimage localities, and where the selling of wine is mentioned, these and their visitors enjoy no good repute. Very little information concerning their arrangements has become known.

The Leonidaion in Olympia may be regarded as a house arranged on a better footing.³³³ The building was of rectangular plan (241.08' x 263.06 ft.), in which halls and rooms were grouped around a court 98.4 ft. square. The court was itself decorated by flower beds and water basins, these indeed being of the Roman period; the columns in the interiors were of the Doric order, while on the exterior, Ionic colonnades surrounded the building, that must have in the most magnificent way fulfilled its purpose as a hotel for guests of honor of the State of Elis, for friendly princes and statesmen.

b. Tombs.

282. Mode of Burial.

To bury the dead decently and carefully was a sacred duty in Greece. the relatives took great care that this should be done; it was strictly held, that even at least a handful of earth should be scattered over the corpse of a stranger.

The prevailing form of burial of the dead was by interment, both in the mother-country and in the colonies. Although cremation was likewise common from a tolerably early time, it does not yet appear to have been uniform in all periods and was not everywhere usual.

283. Place of Burial.

In the earliest period, the dead were buried within their own dwellings; graves were placed in the court or garden, as shown in the plans of the oldest Athenian houses standing on the naked rock (Fig. 245). The corpses were later buried before the gates of the city in special places or preferably on the public roads; burial within the city was then, where it did not remain a custom (as in Tarentum, for example), regarded as a special privilege or a distinction.

284. Marks of Burial.

Special indications characterized the burial places. As widely visible mounds of earth, often surrounded by circles of stones and with a memorial on the apex, were they shaped in the heroic period, as for example, the Grave of the Athenians, who fell in the Battle of Marathon was marked by a mound of earth.

In the midst of the plain of Marathon, a single conical hill, almost bare and with a few bushes, rises about 29.52 ft. high above the level land. This hill is now known as "Soros", and it is held to be the burial place of the 192 Athenians, who fell in the battle near Marathon, and it has furnished the chief grounds for locating the battle-field. But the accuracy of this assumption may be doubted, since the excavations undertaken at this place were without result. The hill was thoroughly examined at the beginning of this century, and Schliemann likewise set the spades at work here 6 years ago. (1886). In spite of these negative results, hope has not been abandoned. A systematic investigation of the hill was recently begun, and this third examining investigation led to the desired success. In the hill of about 164 ft. diameter was cut a trench 19.68 ft. wide and 85.28 ft. long, which laid bare about one-twelfth of the entire area of the base of the hill. But while the earlier excavation was not carried deep enough, this one was sunk to 9.84 ft. below the level of the surrounding plain. So much had the ground been raised in the course of centuries, as it now proved. At this depth below the present surface was found the original surface. Here was found a layer of ashes extending over the entire area of the grave, strewn with burned bones and the remains of burial vases. This find makes it undoubted, that the burial of a great number occurred here, just as might have only been after a battle.

Moreover since the burial vases provided for the dead entirely suit in their style the period preceding the Battle of Marathon, it is no longer to be doubted, that we indeed have here the grave of the 192 Athenians slain near Marathon. The layer of ashes extending over the site of the tumulus is so thick, that one may assume that a great funeral pyre was built on this place, on which the corpses of the fallen were burned. In this layer of ashes are still found brands not completely consumed by fire, but which still permit the structure of the wood to be recognized. The bones found are much injured and show the marks of burning; a great part of the vases are also burnt. Further destruction was then caused by dampness. The pressure of the earthen mound, heaped about 39.36 ft. high above the burial place, may have contributed to the fact, that scarcely a single one of the vases found has remained uninjured. About thirty vases of lechyos form have been found up to this time, which are decorated by black figures hastily painted. If no particular marks of art are among them, this material is still of great value for the study of vases, since a fixed later point is here given for the date. A traditional monument has become a historical one by this discovery, and recalls to the present race the most heroic era of the war of ancient Greece for freedom.

Note 334. From Allg. Zeit. 1890. Also Arch. Deltion. 1890. O tumbos ton Marathonomachon (Pin. D.) p.123-132.

Sepulchres also rise in form of pyramids (Gencrae) from the ground, they are scattered over all Greece as columns and steles. With increasing luxury, they received rich figure sculptures, the originally slender form of the latter become wide Heroons surrounded by columns and crowned by pediments.

353 They likewise arise as great isolated monuments, cut from the solid rock, as a high square pillar on a pedestal, or as in Lycia, are sculptured in form of a sarcophagus or as imitations of houses, artificially detached structures, like chapels or temples. Wealthy houses or families had formal sepulchres, built or cut in rocky precipices, and secured for themselves and their descendants special places as hereditary burial places.

Luxury in these matters appears to have risen to a high point.

Demetrios Phalerus, for example, had to issue a decree to limit them, and accordingly in Attica a sepulchral stele could not rise more than 3 ells above the burial mound.

285. Coffins.

The bodies of the poorer class were buried in the common burial place of their community; sepulchral columns perpetuated their names even there.

If the body of the departed could not be obtained, then an empty grave in imitation of the actual one was prepared as a memorial. For the missing one, an empty cushioned bier was borne at the burial.

The corpse was placed in the clay coffin (*cherameos soros*), which was constructed of burned clay in the form of a roof, and the use of which was among the Athenians regarded as a custom of their fatherland (Fig. 250). Besides the coffin of flat tiles, there were also others of curved plates³³⁵. Also clay chests for the dead (Fig. 251) and wooden coffins were in use. "If then the bones are carried away, then come carts with coffins of cypress wood, one for each community, and the bones of each one are in the coffin of his community," writes Thucydides (II, 34).

Note 335. Compare Stackelberg, O.M.V. Die Gräber der Hellenen in Bildwerken und Vasengemälden. Berlin. 1837.

But the clay coffin also takes the form of the rectangular house with gable roof and gables, the coffin thus representing among the Greeks also the house, the last dwelling of the departed. The desire to decorate it led to painting the smooth clay surfaces (Fig. 252). The earliest Grecian coffins in the form of the sarcophagus later common are^{the} beautiful Klazomenian examples from the 6th century, whose form is moreover not original in Greece, but was introduced.

Marble sarcophaguses with relief ornament seem to first occur in Greece about the end of the 4th century B.C. One of the oldest and most beautiful style is a sarcophagus with the Combat of the Amazons, now in Vienna. This is even excelled by the so-called Sarcophaguses of the Macedonian Kings of the Hellenic period found in Sidon. The latter were discovered in a common sepulchre (Fig. 253), placed in a separate chamber, cut in the rock. Some of them are of the highest art value. Of

really thrilling beauty, of high dignity with wonderful invention and execution, is a sarcophagus with lamenting women, which otherwise bears no marks of painting. Its corners, in which the four surfaces of the lower part intersect, are characterized by Ionic antae, between which stand 5 Ionic half-columns of indeed the most careful execution. In spite of the relatively small scale, no bead, no acanthus leaf, no volute band, and no flutings are forgotten, all being so skilfully, easily and limpidly wrought, with such noble and elegant proportions of the columns, that nothing appears little or labored. ^{Between} the columns are smooth chests, extending to about one-third the height of the columns, before which (2' x 6' + 2' x 3') are placed 18 draped female figures between the columns. No position or posture is repeated and a special and interesting motive is found in each figure. With softly falling garments, bowed heads and folded hands, a figure expresses the deepest emotions of sorrow and pain, like a forerunner of the Mater Dolorosa of Renaissance art. One would almost believe himself standing before a work of the early Renaissance, so strongly, purely, and seriously are the small figures conceived. On two other marble sarcophagi, that exhibit no sculpture on the sides, the antique roof is imitated with wonderful accuracy. No ridge ornaments or acroterias are wanting here; the ridges bear palmations; the water spouts beneath the cyma are perforated; the lids are the most costly models of the Grecian marble roof. On others are sculptured in the tympanum of the pediment a rider with prancing horse, or scrolls of leaves and flowers with round stems, scrolled and grooved, as on the cyma of the Leonidaion in Olympia, or on the Tholos in Epidauros. Everywhere is the grace and beauty of Greek forms with high perfection in execution. The richest among the sarcophagi belongs to the type, where the external surfaces are decorated by figure reliefs, battle or hunting scenes, as shown by the Amazon Sarcophagus in Vienna already mentioned.

But what places the Sidonian especially high above all other known examples is their architectural treatment, which cannot be conceived nobler and more characteristic. Its smooth plinth forms the base, above which extends a member, as on the walls

of the Erechtheion, consisting of round, scotia between two fillets, smaller round, over this being an inverted Lesbian cyma with beaded astragal, fillet and apophyge. The mouldings are ornamented in the richest manner by interlacing heart-leaves and beads, and they form a magnificent base for the sides adorned by figures. The figures are 1.71 ft. high and are wrought in high relief, so that the feet and arms of some are entirely free from the background. The composition of the front side recalls in many ways the famous mosaic picture of the Battle of Alexander in Naples. On the left of the spectator and on a tall horse, Alexander in flowing mantle and with leveled spear charges on the Persians, fallen into confusion, while on the right side, a Macedonian general (Perdiccas ?) with morion on his head and in flowing mantle hastens into the combat with a less animated movement. Alexander wears the head covering to be seen on his coins and appears spirited and warlike, while the countenance of Perdiccas looks grave and gloomy. Wonderful is the movement of the design and wonderfully are the details executed; pain, scorn, and longing for death are remarkably expressed in the faces; the bodies of the infantry, one of whom strikes the knife into the neck of a prostrate man, are finely modelled. The rearing horses have a truth and animation, which recalls a master like Lionardo. The combat extends over one end and in the same compact manner the other side and end are decorated by just as beautiful and animated hunting scenes with equally perfect execution.

357 A cornice terminates the figure frieze, that consists of a heavier geison, whose front surface is ornamented by a skillfully wrought fret pattern, and of an echinus decorated and with a pearl-bead. These simple and noble architectural members, which enclose the wild fluctuation of the battle and the hunt, contribute by their isolation and quiet no little to make the figure composition appear even more animated. On this substructure rests the massive lid, whose vertical members meet accurately at the crowning cornice of the sarcophagus and consist of a low architrave with ogee moulding and scotia, over these being a frieze decorated by vine scrolls (grapes and vine leaves) and an Ionic geison with dentils. The latter are alternately

ornamented by ram's heads and female heads with radiating hair. On the angles of the pediments are sculptured four lions lying down, while fighting figures adorn the pediments, which are indeed rather small in scale. On the front appears a distinguished man, thrown down by soldiers, who surround him.

If this work, executed in the noblest fine-grained white marble, is exceedingly entrancing, we are further entranced by the colors, that cover the sculptures and are in great part well preserved still. Helmets and weapons of the warriors are partly gilded, the mantles of Alexander and Perdikkas are violet purple, the hair is light brown, the eyes and lips are painted in the most careful and remarkable way; the reins and bits of the horses, the arrows sticking in the flesh of the animals, were wrought in bronze, according to the marks and vestiges, and were fixed in place; the vine scrolls of the frieze rise in gold on a ground of violet purple; the little figures of the pediments are not without color. On nude surfaces of figures, the bodies and faces, the marble is smoothed most carefully and it is further finished with a colorless wax polish. Thus the nude surfaces have the effect of a mild and no longer white brilliancy amid the gleam of the other colors, just as the human skin appears in reality. Therefore I could not subscribe to the principle stated by von Treu; ³³⁷ "I hold that a toning of the nude surfaces by mere wax is excluded;" aside from the fact, that I judge the soft or too strong rosy colored flesh tone, erroneously imputed to so many antique sculptures, to be not exactly a happy addition, and in consideration of the circumstance, that various artists have been able to treat their works differently in regard to polychromy, and much may have been a later addition. The colored figures ^{rise} from a white ground and appear distinguished and not gay in their coloring. A good and likewise practical contrast with the colors of the figures is produced by the gold violet broad frieze band of the lid and by the light and shade effects of the richly sculptured ^{base}, which has the effect of a gray ornament painted on gray. ³³⁸

Note 337. In Jahrb.d.Kais. Deutsche Arch. Inst. Vol. 4, p.24. Berlin. 1889.

Note 339. Compare Durm, J. Die Makedonischen Königssarkophage.

Cent. d. Bauw. 1890. p.329; also *Revue Arch. N.S.* vols. 10, 11; further, *Amer. Jour. Archaeol.* 1887. p.97; lastly, *Die Antiken Sarkophagen-Reliefs in Auftrag d. Kais. Deutsche Arch. Inst. mit Benutzung der Vorarbeiten von F. Matz, heraus.u.bearb. von C. Robert. Vol. II. Mythologische Cyklen. Berlin. 1890.*

Simple stone sepulchers, not deep below the surface, where the dead were placed between stone slabs and dry limestone masonry were in use in Chiladromia. Tumulus and pit graves in the heroic period and the placing of the corpses therein have already been treated in Arts. 29 to 34.

286. Deposits.

With the corpse were deposited copper utensils, vessels, small 358 clay figures, favorite animals, articles of clothing, ornaments, and even food (See Fig 251). "Everyone brings to his dead a gift, if he wishes." (Thucydides).

287. Rock-cut Tombs.

The tombs cut in the precipices of the valley of the Nile (see Fig. 7), with the vestibule and two columns between antae at the entrance, are recalled by the tomb-facades of Asia Minor, cut in the rock, whose employment depends on the nature of both countries, and which also suggest the grotto-tombs in Rhodes., Cyprus, in Greece, on the north coast of Africa, in Nauplia and Syracuse, on Crete, Egina, Melos and Delos.

Continuous rows of columns and piers before the sepulchral chambers, that are placed beside each other, and for which are utilized terraced inclined rocky slopes, are found in Cyrene, and also vestibules adorned by columns and pediment, as in Asia Minor.

288. Hemispheres.

Peculiar sepulchral monuments without any claim to artistic development are those originating in the 3^d or 4th century B.C., the hemispheres of blue marble, common on the island of Kasos, which⁵²⁴ have a diameter of 0.82 ft. with the name of the deceased cut on their smooth front surface.

289. Columns and Steles.

Of more artistic importance than these primitive memorials are the columns (chiones). The Grecian sepulchral memorial was developed to its greatest perfection in the Stele, i.e., a tall slab of stone set in the earth or fastened on a base, diminish-

diminished upwards and terminating with a cornice; above this, it had an anthemion cap in simpler materials and only painted, or in richer ones consisting of sculptured luxuriant acanthus ornament with scrolls and palm leaves, which belongs with the most beautiful creations of Grecian decorative sculpture.

The front surface of the slab is further usually decorated by a magnificent sunken seated figure in relief with the memorial inscription beneath and two skilfully wrought rosettes above it (Figs. 254, 255).

359
360 After the 4th century B.C., family scenes were preferred for the reliefs. Some of these represent the departure, the husband extending his hand to his wife and saying farewell, the father to his children, the wife to her husband and children; others are entirely without reference or purpose. 389

Note 389. Others imply by extending the hand merely a token of good wishes and friendship (Compare Comptes Rendus. 1861. p. 102).

290. Hydrias.

A hydria beside such a figure, as frequently occurs on the reliefs of these sepulchral steles, signifies in accordance with the Attic custom, that the person there buried died unmarried. For these unmarried persons, the hydria alone was adopted as a memorial, earlier in clay, later much larger and carved in marble; it might likewise be decorated by sculptures, the same scene of departure, as shown by numerous examples. (Fig. 255).

As sacred places, we find the tombs likewise ornamented by fillets and garlands; formal gardens were also arranged around them in the later period.

291. Heroas.

Heroa was the preferred name for the memorial stone, shaped as a niche between antae or columns on right and left (Aedicula), between which were reliefs, and covered by entablature and pediment. (Fig. 256).

292. Statues.

Portrait statues, if permissible in the heroa, were favorites in the Alexandrine and Post-Alexandrine periods.

293. Chapel and Temple Forms.

The tombs of family heroes and kings were frequently distinguished especially; since their remains were frequently interred in the vicinity of sanctuaries, or in the temples themselves, there likewise arose special tombs for them in the form of chapels and temples. Arkas, the tribal hero of Arcadia, was buried at the altar of the Temple of Hera at Mantinea, and Pyrrhos in the Temple of Demeter at Argos; Amphiaros' tomb was built in the form of a temple (compare Valerius Maximus, VIII, 16); over Castor's grave in Sparta stood a sanctuary built for him.

Aside from the evidence of the writers, considerable remains of the temple-like tombs are preserved. They chiefly consist of a massive substructure, to which steps lead and which contains the sepulchre itself; over this rose in proportion to the substructure a small columnar structure with a gable roof or one in form of a stepped pyramid.

Rich figure ornament decorated the substructure as a frieze or was placed between the columns, as on the magnificent Temple-Tomb (so-called Monument of the Nereids) near Xanthos in Lycia; groups of figures crowned the apex of the pediment or the platform of a pyramid. The columns either merely support the roof, as for the monuments in Mylassa and Cirta, or they surrounded a small cella structure, as in Xanthos and Halicarnassos, or as three-quarter columns ornamented the angles of a cella, as on the Tomb of Theron at Akragas. The greatest astonishment in the ancient world was aroused by the Tomb of Mausolus in Halicarnassos. "it was so extensive and so beautiful in execution, that even the Romans were amazed at it and from it termed their own important sepulchral monuments mausoleums." (Pausanias, VII, 16).

294. Monument of the Nereids at Xanthos.

The Nereid Monument is now regarded as the Tomb of the Lycian prince or Persian satrap Pericles, who took possession of the port of Telmissos about the 102 d Olympiad. On a high substructure decorated by two figure friezes extending around above each other, rose the hieron, an Ionic peripteral structure of 4 x 6 columns with a double cella and entrance between antae, where to obtain space for the doorways, the Ionic columns are

crowded back close to the antae. The entablature consisted of an architrave ornamented by reliefs and a cornice with dentils. The frieze was wanting, as in Lycian facades of tombs. Around the walls of the cella extended a frieze 1.41 ft. high and high reliefs decorated the pediments with statuettes at the apexes and angles of the pediment. Four marble lions guarded the entrance to the cella, and in the intervals between the columns of the portico stood the Nereid figures, to which the monument owes its name (Fig. 257). Everything remaining of the sculptures executed in Parian marble was brought to the British Museum in London (Compare also with what was said on p. 267 of this work, German text).

295. Mausoleum at Halicarnassus.

The tomb, that the Persian satrap, King Mausolus, had placed on the soil of Asia Minor for himself and his sister-wife Artemesia, busied about the middle of the 4th century B.C. all the most important Grecian artists³⁴⁰ of that time. (Compare Pliny, 36, 30, 31). Satyros and Pythios are mentioned as architects; the sculptured ornamentation was entrusted to Scopas, Bryaxis, Timotheos and Leochares. The building still stood in good preservation in the 12th century A.D. in the Carian port, until an earthquake partly overthrew it, and it was at last entirely destroyed by the Knights of St. John (1402 and 1522). In 1846, 43 relief slabs of the monument were found and taken to London; later in 1856, excavations under the direction of Newton brought to light numerous remains of architectural members and of sculptures.

Note 340. Compare Brunn. Vol. II, p. 253, 254. (Pythios, Phythios, Phiteus, Phileos).

Pliny gives the height of the monument as 140 ft. and its perimeter as 440 ft., including the quadriga standing on the summit platform. Judging from the fragments of the statues of the building were about 8 ft. high. Portions of more than 20 marble lions were found; also the highly famed torso of a mounted amazon is to be here mentioned. The reliefs were painted and the facing slabs likewise consisted of kinds of marble of different colors.

296. Grotto Tomb of Syracuse.

On account of the great number and of their different form and construction, the Syracusan rock-cut tombs are especially remarkable. "By them we can follow the changing nature of burial from the darkness of the oldest or Sicilian period through the centuries of the Grecian period until the time of the Roman rule and finally to the Christian Catacombs." ³⁴¹

Note 341. Compare Holm-Cavallari, p. 310-327.

The Grecian tombs found there appear as grotto tombs, and in them constantly occur the characteristic memorial, the separate receptacles for the bodies (Loculi), which may be cut in the rock, constructed of slabs, or may be sarcophaguses of terra cotta or marble. The loculi were always covered by ⁵⁸²slabs and their bottoms were sometimes perforated, to permit the escape of the fluid resulting from the decomposition of the corpse to a lower cavity. Just as characteristic are likewise the flat recesses above the loculi (compare Fig. 258), where is shown a perfectly developed sepulchral chamber of the street between the Latomia of Praadiese and St. Venera.).

An interesting example of an architecturally developed tomb is given by Fig. 259, the erroneously so-called Tomb of Archimides, a tomb chamber of moderate size, whose plan forms an irregular rectangle, and whose entrance side is decorated by Doric architecture cut from the rock at a small scale. On two half-columns rests a complete Doric entablature with architrave and triglyph-frieze with a pediment enclosed by a cyma. The front wall between the columns, in which was the entrance doorway, is now destroyed. The space in the interior served for the deposition of entire bodies or the reception of bones or ashes. (Compare the great niche on the right of the entrance for entire bodies, the five arcosolias of the rear wall and the four of the left side, behind whose fronts were preserved the ~~xxxxxxxx~~ remains of bodies. The holes in the floor contained bones and ordinary Roman urns).

297. Heroon of Giolbashi-Trysa.

A monument of peculiar arrangement is found in the Heroon of Giolbashi-Trysa. Walls of 12.46 to 20.99 ft. high enclose in rectangular form a terrace on the slope of the mountain (64.5

(64.5 × 80.5 × 67.8 × 77.0 ft), to which a single doorway (4.04 × 7.05 ft.) on the least side affords access. The walls are mostly coursed with trapezoidal ashlars, and the two upper courses are decorated by relief sculptures inside and outside, which are terminated by a plain crowning cornice, ornamented by an egg-and-dart moulding. The high external lintel of the doorway supports four strongly projecting winged bull's heads, the jambs on the inside each support an almost life size figure of a dancer in a niche; little figures of musicians ornament the lintel. In the interior stands obliquely to the wall one of the well known Lycian sarcophaguses, that imitated a wooden hut. Outside the walls stand three others, two of which have the form of the wooden hut with gable roof and widely projecting gable, the third having a pointed-arched roof. The latter is almost 16.4 ft. high, while the others have heights of 9.85 and 13.1 ft. The very interesting reliefs on the external south wall represent combats of amazons and centaurs, the war of the seven against Thebes, a landing battle; on the internal south wall are a feast, quadriga of the founder, Belerophon, the slaughter of the suitors, and the hunt of Meleager; on the internal north wall are the robbery of Leukippides, a hunt, the combat of centaurs; on the internal west wall are the battle between the shipyard and Troy; the storming of Troy, Achilles and the amazons; on the internal east wall are combats of Antaeus, deeds of Theseus, and a feast. ³⁴²

Note 342. Compare Benndorf & Niemann. Das Heroon Giolbashi-Trysa. Jahrb.f.Kunst. Samml.d.Oest. Kais. 1889-91.

298. Royal Tombs at Commagene.

The Royal Tombs at Commagene are likewise peculiar. Near the Tomb of Sheshank and above a subterranean sepulchral chamber, there rises a stone tumulus of about 410. ft. diameter, around which are three sculptures supported by pairs of columns, which are so placed at the foot of the hill as to mark on the plan the angles of an approximate equilateral triangle. The pairs of columns are of the Doric order of the later period, each being composed of 7 drums and resting on square plinths. they are connected by plain architraves, on which stand isolated figures. (Two eagles and one male and one female figure, seated beside each other).

Another Tomb near Kara-Kusch shows columns in threes in the same arrangement, but which are not joined by a common architrave, each separately supporting on the abacus of the capital a seated lion and a relief slab with figures (Fig. 260).

At a third tomb and at the foot of a tumulus about 459.2 ft. diameter, three terraces are built, that support figures of ancestors and of gods, built in 7 to 8 courses of stone to a height of 32.8 ft. and then sculptured; seated colossi with relief slabs, lions, and eagles alternate. The location on the high top of a mountain is common to all these tombs. That last mentioned is widely visible, being placed on the Nemrud-Dagh, 6560 ft. high.³⁴³

Note 343. Compare Humann & Puchstein. Reisen in Kleinasien und Nordsyrien etc. Berlin. 1890.

The tumulus of the heroic period again returns and casts its shadow on the end of Grecian art, just as on the beginning thereof!

365- Final Note.

"In few provinces of historical-philological science has in very recent times *"dies diem docet"* played such a part as in archaeology. The condition of quiet content, since the course of the history of antique art has been fixed in its main facts, has long existed, as well as the belief, that one may build further on secure foundations."³⁴⁴ What has been given in the preceding merely represents the most important facts discovered in the time, published and tested.

Note 344. See Blumner, H. Beilage z. Allg. Zeit. 1891. No. 113.

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